THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

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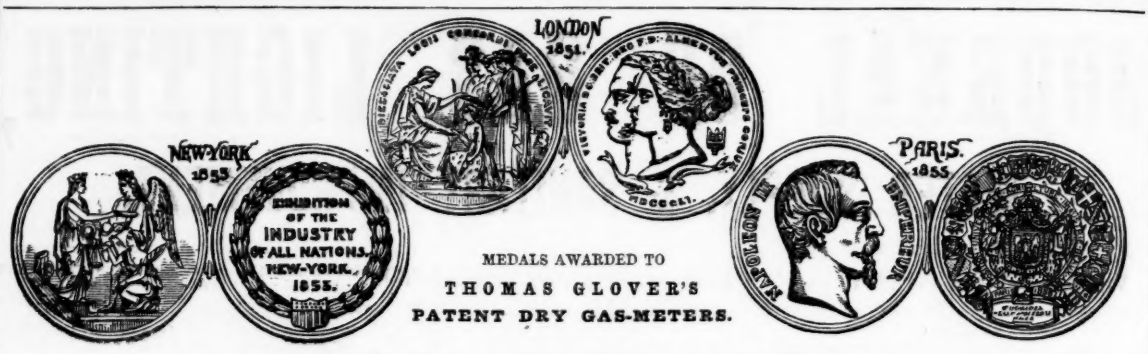

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NOTICES.

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THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MARCH 27, 1860.

NOTES UPON PASSING EVENTS.

By the kindness of a friend in Holland, we have been enabled to make some definite calculations with respect to the force of the extraordinary gale of the 20th of February last—a subject which, from the accounts of the effects produced in the various towns the gale visited, we believe will be found to have a very painful interest to many of our readers. In our last number we stated that we had been informed that the force of the wind had been equal to a pressure of 33 lbs. on the square foot; and it has been stated that at Greenwich a pressure of 28 lbs. was actually recorded. At Utrecht, and at the Helder, some very accurate observations were made, and from them it appears that the force of the gale at the former place was not less than 30·32 lbs. per foot superficial; and that at the latter, it was even 32·16 lbs. per foot. Smeaton classed a wind having a pressure of 31·49 lbs. per foot as being, properly speaking, a hurricane; and, as all the instruments hitherto employed for registering this class of phenomæna are somewhat unsatisfactory, we may fairly consider that the gale of the 20th of February was one of the most violent of any hitherto observed. We see, by a reference to the columns of the *American Journal of Gas Lighting*, that a similar gale passed over Philadelphia on the 10th of February, and that the roof of the new Retort-House of the works of the town was blown off. It becomes a matter of curious speculation whether there were any connexion between the two gales.

The observations made on this occasion give a rather more certain value than had previously been admitted to the coefficient which should be employed in calculating the stability of chimneys, lighthouses, or such lofty isolated structures. The formula usually adopted in such cases is the one given by Fresnel, and it is based upon the assumption that the materials of which the structures may be composed are not susceptible of lateral motion; or, in other words, that they constitute rigid bodies, which are only able to fall by turning upon their lower edges. Fresnel then gives the formula, $x = a\,b \times \frac{c}{2}$; in which x, represents the stability the chimney or column ought to present; a, the surface exposed to the action of the wind; b, a coefficient representing the force of the wind; and $\frac{c}{2}$, the lever with which that force is exerted, or on the average, half the height. The stability, of course, would be found by multiplying the weight of the structure by half the width of the base; and as we know, from the experience of the 20th of February, that hurricanes with a force of about 33 lbs. on the square foot occur in our latitudes, it will be necessary hereafter to assign to b, in the above formula, a value at least equal to 66 lbs., or one in excess of the value assigned by Fresnel himself. A chimney we are acquainted with, and which had been designed in accordance with the formula, but with a value of b equal to 30 lbs. on the foot, was overthrown in this gale. It was square, we may add, and Fresnel gives the resistance, offered by a cylinder to the action of the wind, as being only two-thirds of that offered by a rectangular prism.

The moral storm which has lately produced such sad confusion amongst the building Trades of the Metropolis, has not been allowed quietly to be inurned; for Mr. Potter and his friends have had the singularly bad taste to utter a rather loud cry of exultation for being virtually beaten. We suspect that this unfortunate conflict may be renewed in the course of the next autumn, unless the Masters take their precautions in time; for the immense public works now in course of execution in London will create a greater demand for labour than the ordinary market can supply. It is true that the works we especially allude to will not employ all classes of tradesmen; but it is by no means improbable that, if one section should succeed in obtaining a rise of wages, the others would follow their example. There would be nothing wrong, on the part of the men, in thus obtaining the highest possible price for their labour; and, if they move avowedly for such a purpose, they may depend on receiving the popular support which has failed them in their recent attempt to obtain ten hours' wage for nine hours' work. But, however that may be, it is essential that all parties who are about to build should look this contingency fairly in the face, for it must have an important bearing on the cost of such operations.

The inquest upon the sufferers by the accident at Tottenham has terminated in a verdict which really implies very severe blame to the officials connected with the locomotive department of the Eastern Counties Railway, that architype of mismanagement. There have also been some other sad accidents in the exercise of the trades our readers are usually interested in (as, for instance, the case of a blast-furnace bursting and killing several victims), and we are thus forcedly reminded of the necessity for providing against the risks and dangers of our own pursuits. An attempt was made a short time since in this JOURNAL to induce our correspondents to establish some general Gas Manufacturers' Provident Institution; but little has been done to secure that desirable object. Is there no mode of reviving the good feeling which first led to the suggestion? Surely the class of persons we address are sufficiently enlightened, and generous enough, to lend their willing aid to the cause.

It is possible that something of this description may come within the sphere of action of the proposed Gas Association, which we have reason to believe has recently been organized by some of the most influential gentlemen connected with that important branch of industry, who have felt that at present there is no common feeling, no bond of union, amongst their professional brethren. The objects of the proposed Association are mainly the promotion of science, and the development of a feeling of goodwill amongst Gas-Makers and the cognate branches of manufacture; and, as soon as the Committee have drawn up the regulations for the provisional organization of the

Society, we understand that an appeal will be made to all the parties likely to be interested. In the meantime we cannot refrain from urging our readers to carefully examine the question when it comes before them officially; for it seems to us monstrous that an interest, so important as that of Gas-Making, should not have some better method of making itself heard, and felt, than it now possesses; and that serious inconvenience arises from the absence of any general system of intercommunication between the respective parties concerned. Union in the pursuit of scientific knowledge is, indeed, strength; the absence of any such community of action and feeling has been a fruitful source of jealousy amongst the members of the great interest alluded to; and, unquestionably, much of the ridiculous legislative interference, of late years, with the exercise of the gas-making profession, may be attributed to the defective social organization of its members.

There was lately tried before Mr. Trail, the stipendiary magistrate of Greenwich, a case of so much importance to the inhabitants of London, that we cannot refrain from expressing the wish that the opinion of some higher tribunal were taken upon the subject. It appears that the Metropolitan Board of Works had issued a precept to the Greenwich Local Board, in March 1857, requiring the latter to pay on or before the 31st May 1858, the sum of £10,723. 14s. 8d. From a series of causes explained in the course of the trial, the money was not paid at the time, and, in the month of August last, the Metropolitan Board took the collection of the rate into their own hands. The proceedings before Mr. Trail were for the purpose of trying the legality of this course, and, though some small technical objections were raised as to the mode of publication of the rate, the real ground of opposition consisted in the plea that the rate had not been made, and demanded, within six months after the debt had become due. Mr. Trail decided that, however reprehensible such conduct might be, and however great the hardships it might entail, the present state of the law was such, that the Metropolitan Board of Works had the power to refrain from pressing their claims on any particular district for an indefinite number of years, and then to come upon it for the peremptory payment of a large sum of money. A case for the Court of Queen's Bench was granted; and it is to be hoped that this monstrous abuse of the rating-powers of the Central Board of Metropolitan Delegates will be thoroughly exposed, even if it cannot be redressed without an appeal to the Legislature. Is not the whole story, however, another illustration of the results of the empirical legislation of late years? Really it would seem from it, that it is at the present day necessary for any one who may be about to take a house in London, to examine the whole series of accounts of the Metropolitan Board of Works, in order to discover the amount of responsibility he would thus incur; and, after the experience Londoners have recently acquired of the value of the official audit of the accounts of such municipal bodies, it is more than doubtful whether any amount of precaution would protect an intended householder from retrospective rating.

We have lately, in the course of our own professional experience in London, met with some instances of an action upon the durability of metals, which has attracted more attention abroad than it has done in our own country, but which, perhaps, it may be as well to bring before the notice of persons interested in the stability of buildings. Now, during the Crimean war, the officers of the French Génie Militaire, observed that the bullets which were kept for any length of time in store, became riddled by a species of boring worm; and, in consequence of the researches instituted on that occasion, it was ascertained that the worms in question were common in some districts on the shores of the Black Sea. The action that we have noticed in London seems to have some connexion with this class of observations; for we have found that lead-flats have been, in some cases, pierced, or, at least, have decayed in species of pin-holes, to the great injury of the subjacent woodwork. It would be desirable, that some consecutive observations should be made upon this subject, because the use of lead in building, and in chemical manufacturing operations, is now extending in so extraordinary a manner, that the conditions of its decay assume a direct importance. There is something peculiarly interesting to a lover of abstract science, too, in the singular discovery of this new description of destructive animal action, so analagous to the sudden re-appearance of the terredo navalis in our Northern seas, about the end of the seventeenth century; or to the occurrence of new forms of disease. How powerless is our boasted science to explain these mysteries!

Whilst thus upon the subject of practical lessons in the art of construction, it may be as well to allude to the story of the fall of Thurston Church Tower, Suffolk—where, by the way, the lead gutters had disappeared, not through the agency of boring worms, but by the more vulgar one of thieves, at some rather distant period. In this case, it appears that extensive repairs were executed, a few years since, for the purpose of consolidating the Tower; but that an old opening, which had formerly been blocked up, had been re-opened. The body of the walls was executed, as is so frequently the case in Suffolk, of flints set in *chalk lime* mortar, and no care was taken to bond the work; so that, in fact, the walls were composed of two external coats, filled in with incoherent rubble. It seems as though water had obtained access to some parts of the lower walls, and that, although fair warning of the existence of the danger had been given, no steps were taken to consolidate the building. It is strange that structures which have thus stood the action of ordinary causes of decay for centuries, should thus suddenly give way without any apparently adequate reason. For our own parts, we suspect that the Tower itself was built in such a manner as to bring upon the lower parts of walls a greater crushing weight than they ought fairly to have supported, and that the re-opening of the doorway was one distant cause of the fall, by thus increasing the pressure on the bearing surfaces, at the same time that the work was injured by the jar. This accident also furnishes another illustration of the danger arising from the use of the chalk lime (or in fact of any pure limes) in external walls.

At Inverness, the attempts recently made by the Police Commissioners to reduce the prices of the municipal services of lighting and watering the town have been signally defeated, and the inhabitants of that town will now have the pleasure of paying, in addition to their old rates, "the little bill" of the professed agitators who thrive by encouraging a spirit of litigious antagonism between municipal bodies and their contractors. In the great economy of nature, certain vermin are necessary, or they would not of course exist; and so in complicated civilized societies, the mischievous class of men we refer to may also be required to keep their neighbours in mind of the insecure tenure by which they hold even their own rights. But the good taste and the good feeling of those who live in, and by, the storms they thus constantly raise, may be more than questioned; and, ultimately, we should think that even as a trading speculation, it would be found preferable to endeavour to arrange difficulties, than to urge them to extremities by endeavouring to justify unreasonable demands, provided only they be made by parties supposed to represent the public interests. In the crowded state of our columns to-day, we are not able to treat this subject with the development it requires; but, most certainly, we will return to it on some future occasion,

In the Committee of the House of Commons upon the Manchester Water and Improvement Bills, some rather curious facts illustrative of the doctrines and practice of the Manchester school of municipal government have been elicited. Thus, with regard to the Water-works of the Cotton Metropolis, it would appear that, after the ratepayers had been put to an expense of £770,000, it was found that the supply of water to them was not one-half of what it ought to be, and that the works were so deficient, and in such an unsatisfactory state, as to require an additional outlay of not less than £195,000. Now the inhabitants of Manchester must, we should think, be painfully impressed, by this fact, with the dangers and difficulties attending the attempt to turn their own purveyors of water; for, if they had been wise enough to have left the supply of water in the hands of a Company, the community would not thus have been called upon to provide for the miscalculations and the mishaps of the gigantic experiment undertaken in 1847. We see also by Mr. Bateman's evidence that, even amongst some of the most distinguished Engineers, the dangerous system of calculating upon *average* rainfalls in designing "gravitation" water-works, instead of upon the *minimum* ones, still prevails; and we take this opportunity of repeating, that, so long as this continues to be the case, so long will the parties trusting to so dangerous a principle find themselves exposed to the inconveniences of a short supply precisely at the periods when water is most needed. But the most extraordinary part of these proceedings was the decision the Committee came to

upon the petition of the Gas Consumers against the Improvement Bill; for on that occasion it was distinctly affirmed that the Gas Consumers, being presumptively the richer part of the population, were fairly made to contribute to the expenses of the town improvements in the shape of an increased price of gas, beyond that which would have been charged had that price been regulated solely by the economical considerations connected with the manufacture and sale of Gas. Never, in fact, was the principle of the indirect taxation of one class of the community for the benefit of the rest more openly avowed than it was on this occasion, and we are ashamed to say that a Committee of the House of Commons affirmed this doctrine of socialistic spoliation. The injustice, moreover, of this conduct in the case of Manchester is the more revolting, because an allowance is made to the large gas consumers proportionate to their rate of consumption; so that really the contributions to the improvement-funds, levied through the sale of Gas, are paid in a much greater proportion by the poor Gas Consumers than by the rich ones. If, therefore, the improvement of Manchester must still be paid by the Gas Consumers alone, there is a manifest interest on the part of the latter to get rid of any inequality of price. The primary error which, however, involves all these mischievous consequences, all these practical injustices, consists in the fact of the municipality turning traders. Had the inhabitants of Manchester left the sale of Gas and of Water in the hands of private companies, it is tolerably certain that both those essential elements of comfort would have been supplied at lower prices, and in a more satisfactory manner, than they now are. At any rate the Gas Consumers must now direct all their efforts towards the reform of the Town Council, (in order to limit the execution of so called improvements at their expense,) if they should not be able to secure the adoption amongst the population of Manchester of views more in accordance with the principles of justice.

We observe by the foreign scientific journals that the extraction of mineral oils from the bituminous schists of the neighbourhood of Belley, has lately been undertaken on a rather large scale; and we call attention to the subject, because this branch of industry is attracting notice from foreign capitalists in a manner likely to affect the value of some descriptions of gas property. A certain amount of geological interest is attached to the discovery of these bituminous schists, because they would seem to be in some way or other connected with the deposits of Asphalt near Seyssel; and possibly they might be made to throw some light on the subject of the formation of the more recent descriptions of fossil fuel; as for instance of the so-called lignites of Tuscany and Sardinia, as to whose origin, and real nature, we confess that we entertain opinions rather in discordance with those usually received.

LESSONS FOR AMATEUR GAS LEGISLATORS.

THE proceedings in the Parliamentary committees on gas bills this session, have shown that provincial agitators have followed the example set by the delegates from the metropolitan parishes, in making most unreasonable, if not outrageous, demands on their local gas companies; but the complete defeat sustained by the opponents of the Dover Gas Company's bill, and the check given to the Local Board at Torquay, supported by Mr. Hughes, in the committee of the House of Lords, will tend to bring such bodies to reason, and may foreshadow to the metropolitan delegates themselves, the defeat their projects may sustain when they come before a similar tribunal.

The circumstances under which the Dover bill was brought before Parliament were briefly sketched in a recent article, entitled, "The Battle of the Jones's," in which it was stated that a consumer's company has been attempted to be formed there, under the sanction of the Local Board of Health, and that the application to Parliament by the Dover Gas Company, for additional powers, was made the occasion of a somewhat strong war of words. The promoters of the consumer's company having no *locus standi* before the committee, the local board stood forth, on their behalf, as petitioners against the bill, which they endeavoured to defeat by the introduction of a number of oppressive, if not impracticable, clauses. No fewer than thirty-four amendments and clauses, the production of the joint ingenuity of Messrs. Hughes and Beal, were proposed to be introduced, most of them being copied *verbatim* from the Metropolitan Gas Regulation Bill, introduced into the Commons, last session, by Sir John Shelley. The Dove Local Board were credulous enough to expect that a committee of the House of Lords might be induced to insert clauses in the bill, which would render it necessary for the company to obtain their consent before any extensions, alterations, or even any improvements could be made in the works—to compel the company to lay down service-pipes, free of cost to the consumer, at a distance of 100 feet from the main—to give the consumer power to discontinue the use of the company's gas on a fortnight's notice, whilst the company were to be compelled to give a notice of two months—to make it compulsory to maintain, "at all times," a pressure of not less than one inch of water—to give extraordinary powers to an examiner, to be appointed by the board, to interfere in the company's works—to limit the meter-rents to 10 per cent. on the prime cost—and to make it compulsory on the company, under a threatened penalty of £100, to maintain the gas, at all times, "free from ammonia, bisulphide of carbon, sulphuretted hydrogen, and other substances and gases, deteriorating its purity or illuminating power." Such was the nature of some of the clauses attempted to be introduced into the bill; but every one of them was summarily rejected by the committee.

The Dover company's bill, as passed by the Lords, and sent to the Commons, fixes the maximum price of gas at 5s. 3d. per 1000 feet, and the quality at 12 sperm candles for the 5 ft. argand burner, except during frost or in consequence of some other unavoidable cause or accident, which may deteriorate the quality. A scale of discounts was originally inserted in the bill, by which the maximum price to consumers of 24,000 cubic feet per quarter was reduced below 5s. 3d. per 1000 feet, while those consuming upwards of 48,000 feet per quarter, would have it obtained at 4s. 8d. per 1000 feet, so that the private consumers are really placed in a worse position with regard to the maximum price by the interference of the Local Board. The committee have, however, introduced words into the quality clause, to which objection may be raised; as it is provided that the gas "shall, as far as possible, be free from sulphuretted hydrogen and other compounds deteriorating its purity." There may be some quibbling about the words "as far as possible," and it would have been better to have substituted "practicable," which is evidently meant, for the committee could not have contemplated that the gas should be as chemically pure as laboratory experiments might make it.

In the meantime, the metropolitan delegates have burst the bounds of reason, within which it was supposed they had submitted to be confined, and have thrown themselves once more on the sea of discord. The arrangement between their representatives, and the representatives of the gas companies, by which, as was fully understood, nearly all the points of difference had been adjusted, has been thrown to the winds, and Sir John Shelley last week, presented to the House of Commons, the new metropolitan gas regulation bill, which, as a matter of course, was read a first time. The bill thus presented has not yet been made public, for the delegates seem to have great objection to disclose what they are doing and intend to do. But, though we have not seen the bill with its latest emendations, we have obtained a sight of it in the form it assumed about three weeks ago; when it was submitted to the gas companies, with a view to a mutual agreement on its clauses. We have also before us a circular from Mr. Beal to the delegates (No. 74) mentioning the alterations the gas companies proposed to make in it, and as the bill is in substance the same as the one of last session, it may be conjectured that the proposed alterations are somewhat extensive. Sixteen of the clauses are struck out bodily, and many of the others are so amended as materially to alter them. It appears from the running comments of Mr. Beal on the proposed alterations, that they by no means meet with his approval, and after characterizing them as "most objectionable," and expressing his doubts as to whether they were "seriously proposed," he winds up by observing, that "some of the suggested alterations are so flagrantly dishonest and galling, so repulsive to common honesty and commercial life, savour so sharply of a desire to coerce the public and leave them resistless in the hands of the companies, that publication would arouse public indignation"; he, therefore, suggests that as publicity would only "widen the breach," it is desirable to conceal the proposed alterations. This is, no doubt, very considerate on the part of Mr. Beal, but we venture to suggest that if he seriously desires not "to widen the

breach," it would be as well not to indulge in irritating expressions.

With this experience of the Dover Bill before us, we obtain a tolerably clear insight into the manner in which a committee of the House of Lords would deal with the Metropolis Gas Regulation Bill, should it come before them in the shape it assumed a fortnight ago; but there is no reason to suppose that it will ever reach them in such a form. The House of Commons' committee will no doubt be guided by similar principles, and as the Dover Board of Health could not get one of the clauses of the delegates introduced into the Dover Gas Bill, the same clauses, we may feel assured, will not be allowed to pass through the committee when they appear in their original form. The proposed quality clause was word for word the same; so with the clause requiring a constant pressure of one inch of water in the mains, and the proposed meter rents were also copied exactly from the Metropolis Gas Regulation Bill; indeed, in every point where circumstances permitted, the clauses of that bill were brought under consideration of the Lords' committee, and were ignominiously scouted. This rejection of their pet project by anticipation must prove a heavy blow and great discouragement to the delegates, and it is probable that the decision in the Dover case may influence them in moderating their demands.

Among the special clauses of the Metropolis Gas Rgulation Bill to which the companies object, are those wherein they are handed over to the tender mercies of the Board of Works, among the numbers of which, some of their most bitter antagonists have influence; and in every instance where the name of that Board occurs in the delegates' bill, the companies have substituted the Board of Trade. The delegates would, no doubt, find it convenient to have influence in the appointment of auditors of the gas companies' accounts, and, in directing the Attorney-General to institute proceedings against them, but such an arrangement would scarcely be in accordance with the principles of common honesty to which Mr. Beal appeals, nor is it likely to find sanction in a parliamentary committee. We venture to think, indeed, that such a tribunal will differ materially from Mr. Beal in his idea of what is "repulsive to common honesty and commercial life," and that they will concur with the gas companies in nearly all their proposed amendments.

Sir John Shelley, who as the zealous advocate and mouthpiece of the delegates, has been carried by his zeal rather beyond the point of discretion, placed the following notice of motion on the notice-paper of the House of Commons for Thursday the 15th inst.

> Gas companies,—returns from all gas companies established under Acts of Parliament in England and Wales, stating the amount of capital employed for every £100 of gas rental; the gross expenditure in Coals for every £100 of gas rental; the net cost of coals for every £100 of gas rental, the residuary products being deducted; the working expenses, exclusive of coals, for every £100 of gas rental; the gross cost of gas for every £100 of rental; the net cost; the net profit upon every £100 of gas rental applicable to the payment of interest and dividends; and of coke, tar, breeze, and liquor for every £100 expended in coals for the last financial year of the company:
>
> From each gas company lighting any portion of the metropolis within the area of the Metropolis Local Management Act, of the number of shares; the amount of share capital: the amount paid upon each share; the total amount of capital paid up; the rate per cent. of dividend per annum, and the total amount thereof; the amount of debenture debt, with the rate of interest, and the amount of interest paid thereon; the amount of all other borrowed capital, with the rate of interest paid thereon; the amount of all undivided profit carried to the capital Account, and the rate per cent. of dividend paid thereon; and the amount of the reserve fund for each of the last five years, separately, terminating with the last statement of accounts made at any meeting of shareholders of such company:
>
> And, copies of all reports transmitted to the Secretary of state for the Home department by any gas company supplying gas in the metropolis on the state of their works, in pursuance of the provisions of any Act of Parliament requiring the same, specifying when such reports have ceased to be presented in consequence of the repeal of the Act requiring such report, and of all regulations and orders issued on such report by the Secretary of State.

There seems to be no reason why the disclosure of the internal management of the affairs of public companies should be confined to gas companies, and if they were required to make such returns, a similar kind of return might be, with equal justice, enforced from banking companies, ship companies, insurance companies, and all other joint-stock concerns. We imagine that this reflection must have occurred to Sir John Shelley himself, who is chairman of at least one public company, for he has since withdrawn the notice. It is to be hoped he will take warning from this *escapade*, and that in future he will allow himself to think whether the requests of the delegates be reasonable before he rushes into action.

THE SERPENTINE COMMITTEE.

It really would seem that the Select Committee for inquiring into the various schemes for the improvement of the Serpentine river, had suffered the name itself to influence their proceedings, for, like a wounded snake, they "drag their slow length along." Yet the question is, in itself, a very simple one, if only it were divested of the mystery in which the paid advocates and the injudicious friends of the rival schemes have involved it; and it is one which the common sense of the London public would long since have solved, had not an adroit set of schemers perverted the organs of public discussion to their own purposes. In fact, the whole tale of the Serpentine improvement, is one of the most striking instances we can recollect, of the mischief our system of anonymous journalism is able to produce; and Mr. Lillwall, especially, under the numerous pseudonymes he has adopted in the columns of the *Times*, may flatter himself that he has succeeded in making a very goodly pother about nothing—or as one of his colleagues in the Thunderer would say, "*beaucoup de bruit pour un poulet*."

It seems, indeed, now to be tolerably well ascertained, that the whole of the stories about the foul state of the Serpentine waters were gross exaggerations, and that the only real defect of those waters consists in the facility with which they, in common with all stagnant pools, allow the growth of aquatic vegetation in the warm summer months. How, then, was this objection to be obviated in the most simple and economical manner? seemed to the late Mr. Fitzroy to be the real problem to be solved; for he manifestly was disposed to cast as little as possible of the expense of improving the Metropolis upon the national expenditure; and, therefore, he only consulted Mr. Hawksley upon the narrow question, as to the best method of "purifying the water of the Serpentine." All the excitement Sir J. Shelley, and the other advocates of Messrs. Easton and Amos's job, have endeavoured to create, is thus extraneous to the matter; because the nature of the bed of the river, which they have brought so prominently forward, has little influence upon the purity of the water, and if even that bed be so foul as to require instantaneous measures of improvement, there can be no reason for their not being carried on simultaneously with the execution of the works Mr. Fitzroy had ordered to be commenced, under the advice of, certainly, the first hydraulic Engineer of the age. It is, indeed, worthy of remark (as illustrating the manner in which the machinery of our public press, and of the Select Committees of the House of Commons, can be worked), that the whole of this long inquiry has originated in the disappointment of one of the Government contractors, who has been prevented from having his own way in a case wherein he considered himself tolerably sure of his object; and that if the Duck Island pumping scheme had not been set aside, nothing would, in all probability, have been heard about the black mud, or the foul bottom of the Serpentine. The natural consequence of this strange confusion of professional positions is, that the Duck Island scheme becomes invested with an extraneous degree of importance; and, as the ground of contention is narrowed by the conduct of Messrs. Easton and Amos's open, or anonymous, friends, to a choice between their scheme, and the one recommended by Mr. Hawksley, the public ought to be made acquainted with the real merits of the two. At present, they have not the means of forming any opinion upon the subject; because, firstly, all the evidence which was taken before the Committee has not been published; and, secondly, because the Reports of the proceedings which have hitherto appeared in the daily Press, have been most shamefully garbled, and falsified. Another unfortunate circumstance connected with this inquiry is, that the Committee was far from being a fairly selected one; and that the members whose presence upon it was especially objected to, have taken a very objectionable line of conduct throughout the investigation. Of course, it is not for us to cavil with the freedom of action of either the Members of Parliamentary Committees, or of the parties appearing before them. But we must say that, throughout this inquiry, there has been displayed an amount of personal feeling, and of bad taste, which it would be difficult to match in any similar case. Before examining, therefore, any of the evidence already given, we beg to record our protest against much of the conduct of the parties who have hitherto taken a part in the discussion, or in the Parliamentary inquiry; and we add, that we do so with a deep feeling of humiliation at finding that our Representa-

tive institutions can be perverted into the means of raising such a storm in a teapot.

Mr. Hawksley, arguing no doubt on the supposition that the drainage from the gravel in Hyde Park, and Kensington Gardens, was sufficient to replace the water of the Serpentine which might be lost by evaporation in the summer months, has recommended that a system of filtration of the collected waters should be adopted for the purpose of removing the offensive vegetable matters they might contain; and he has proportioned his filter-beds, so as to be able to pass the whole of the normal contents of the Serpentine through them in the space of one month. Messrs. Easton and Amos, propose to sink a well, or to enlarge the existing well, on Duck Island, and to provide and work a steam-engine for the purpose of raising a supply of fresh-water from thence, which should be able to change the whole body of the lake in about the same time. The question of the form and nature of the bed being, it must be always observed, pefectly distinct from either of these schemes; and, consequently, the choice between them must depend on the relative qualities of the water it is proposed to supply, or to deal with.

Now all parties are agreed that the Serpentine water is by no means an objectionable one, under normal circumstances. It is distinctly of the same nature as the shallow-well water of the London gravel; and provided it be not contaminated by the intermixture of sewerage, it is not exposed to any disagreeable actions from within, so to speak; that is to say, it does not ferment, or give off, perceptibly, any foul gases. As to the growth of vegetable life, it may be observed, that all waters are more or less exposed to this inconvenience, (if inconvenience it be,) especially those waters which may contain large proportions of mineral salts; and that even the filtered Thames water, if exposed to the sun's rays in the Serpentine, would rapidly be covered with vegetation. Neither theoretically, nor practically, then, can there be said to be any objection to the Serpentine water; and the whole question, so far as Mr. Hawksley's scheme is concerned, resolves itself into the one connected with the compensation for the loss by evaporation. A very slight improvement in the surface, and in the deep drainage of Hyde Park and Kensington Gardens, would solve this difficulty; and, moreover, it would enable the Government to dispense with the assistance of the Water Companies for the future replenishment of the Lake. As to the sizes and manner of working the Filter beds, Mr. Hawksley has had more practical experience in these matters than any man living, and he may safely be trusted to arrange such details, notwithstanding the rather captious criticisms of some of his professional brethren.

But the Duck Island well, which has been ostentatiously put forward as the best source of supply for the quantity of pure water wherewith to renew the contents of the Serpentine, and to which Sir J. Shelley had, with singular impropriety, committed himself before he had heard any evidence on the subject, is now known to yield a water of the most objectionable quality, and of a very insignificant quantity. And, here we at once express our surprise that the Select Committee should have received as evidence, the gaugings made by Mr. Easton himself, of the quantities pumped from the well on the 13th of March. Of all men who should have been heard on that score he should have been the last, for he has a direct personal interest in the matter; and we have even heard rumours of a nature to induce us to believe that the results he reported were, from the use of some defective formula no doubt, greatly in excess of those obtained at the same time by other parties. But even if the quantity said to have been raised were really correct, there seems now to be no possibility of denying that the water obtained from this well, in these quantities, is perceptibly affected by the infiltration from the numerous sewers which surround the well, and which intercept the flow, be it observed, of the water from the upper portion of the gravel bed lying on the top of the London clay. There has been a rather startling discrepancy between the parties giving what it is the custom to call the scientific evidence on this matter; and, it seems to our profane minds, that little credit has thus been conferred on the class of men who could so lightly venture to express opinions so discordant. After all, however, even on the supposition that all the discordant analyses, lately given, were correct, it may be considered that they only went to show the exact composition of the particular samples analyzed; and thus they prove the small value which ought really to be attached to the very limited range of observations they may be supposed to support. "*Non nostrum inter vos tantas componere lites.*" We find, nevertheless, that the majority of the Chemists consulted have recognized the presence of large quantities of organic matter in the Duck Island water; we have heard, from very credible sources, that its smell during the nights of the 13th and 14th instant, was very repulsive; we know that during the hot weather of last summer, the water in St. James's Park was exceedingly unpleasant, both to the eye and nose; and, in distinct contradiction to Mr. Lillwall and the *Times*, we assert, that the burthen of the evidence hitherto given on the subject of the Duck Island Well, has been decidedly unfavourable to its adoption for the supply of the Serpentine.

It is possible that there may have been some exaggeration in the estimate of the danger which the pumping from Duck Island may produce on the houses in Westminster; but the issue thus raised has nothing whatever to do with the real question, any more than the original area of the permeable gravel under London has. The water from Duck Island Well is simply detestable, and as such whether it be supplied by infiltration from the Thames, from the gravel of this part of the town saturated with sewerage or cesspool water, or by the direct leakage of the sewers, it never ought to be used. The *Times* of the 26th, in its anxiety to find fault with Mr. Hawksley's scheme, wilfully overlooked, or perverted this fact; and, at the same time it, with equal injustice, made his filter-beds responsible for the storm overflow from the Bayswater Brook sewer, perversely forgetting to mention that the diversion of the water from this overflow was very soon to take place, and that Mr. Hawksley in his evidence had distinctly stated that, in addition to this diversion of the storm overflow, "a sewer is about to be constructed across the Park, and of course the inlet to the Serpentine will then be blocked up." The "*suppressio veri*" and the "*suggestio falsi*," of which the opponents of Mr. Hawksley's scheme have been guilty have, indeed, throughout this inquiry been of the most extraordinary nature; and we can but repeat our advice to the public to suspend its decision upon the matter until the whole of the evidence shall be before it. At present, very few people understand the nature of the various works proposed, and the little which has been published has been generally characterized by such signal bad faith, as to reflect indelible disgrace on the parties who have lent themselves to it.

Circular to Gas Companies.

The efforts of the gas-meter manufacturers, in all parts of the kingdom, to give the Sale of Gas Act a fair trial, are exhibiting themselves in various directions, and there now seems a fair prospect of the manufacturers succeeding in obtaining what they want. The Astronomer Royal's notion that he had complied with the provisions of the Act by depositing at the Exchequer Office a standard cubic foot measure, and by declaring that it must be accepted as the required gasholder, seems now to be generally scouted, even in official quarters. After the conferences of the deputations of the meter-manufacturers with the Treasury and the Board of Trade, reported in our last number, the former held a general meeting, at which petitions to Parliament were agreed to, and the members resolved themselves into a "Gas-Meter Manufacturers' Association," for the purpose of advancing the interests of the trade. The petitions were presented to both Houses of Parliament on the 16th inst,—in the House of Lords by Lord Redesdale, and in the House of Commons by Mr. Sheridan—and drew forth very satisfactory remarks from the Duke of Newcastle and from Mr. Milner Gibson. We gather from the interesting discussions, a full report of which will be found in another column, that the scientific officials of the Board of Trade have satisfied themselves that the apparatus deposited at the Exchequer Office is *not* sufficient, and that real model gasholders to measure gas are about to be made and deposited. The Board of Trade have come to the conclusion that the Act does not require any immediate amendment, and that it may be carried into execution in its present form. That opinion was communicated to the Treasury on the same day that the petitions were presented, and a hope was expressed by the Duke of Newcastle that, "before very long," the difficulties complainedof by the meter-manufacturers would be removed.

Matters are, therefore, in a satisfactory train for carrying the Sale of Gas Act into operation, and for trying practically whether it will answer the desired end. We assume from the

exertions made by the meter-manufacturers to remove the obstacles thrown in its progress, and from the many advertisements of the trade, referring to Lord Redesdale's Act, that they are satisfied it can be efficiently worked; though no doubt a measure so entirely new will be found, when put into operation, to require some amendments which experience alone can point out. Some change also in the construction of small ordinary wet meters will probably be required, to adapt them to the provisions of the Act in a satisfactory manner. The cutting down of the spouts to the true water line has, occasioned more difficulty than some manufacturers at first contemplated, and has given rise to numerous complaints, owing to the closing of the float-valves on a sudden increase of the pressure. In an ordinary three-light meter, as usually constructed, the range of the float has been diminished by the compulsory clauses of the Act, from about half an inch to the eighth of an inch; consequently, the slightest depression of the valve will produce a flickering of the flame. This inconvenience may be removed, as suggested in some recent "Remarks on Gas-meters," by Mr. Paddon, by enlarging the sectional area of the float, so as to increase its resistance to depression in the water by sudden pressure, while it will remain equally, if not more, sensitive to depression caused by lowering the level of the water. Mr. Paddon also increases the diameter, and diminishes the depth of his meters to the proportions introduced by the late Mr. Wright, by which means the advantages are obtained of a greater range of water-level, and of a more convenient front chamber. There are other arrangements in addition to those recommended by Mr. Paddon, by which the stability of the float, and the efficient action of the valve may be maintained with a small range, so as to overcome the difficulty which has in some instances arisen from cutting down the spouts to the water-level; therefore, we do not anticipate that the Act will require amendment in that respect.

That portion of the Astronomer Royal's report which recommended the appointment of a scientific gentleman to adjust the "gas measures" in the meter inspectors' offices in all parts of the kingdom, seems likely to be adopted, even should real gasholders be deposited, examined, and stamped in the Exchequer Office; and the mere inkling that such an appointment was in prospect, has already generated an active intrigue for its possession. Mr. George Glover, the brother of Mr. Thomas Glover, the well-known dry-meter manufacturer, has by some means contrived to gain the ear of certain persons in office, who have recommended him as a fitting person to fill the not yet created appointment. What Mr. George Glover's personal fitness may be to discharge the important duties that would devolve upon any person in that position we will not pretend to determine, but his intimate connexion with his brother would, we think, be sufficient to disqualify him from holding such an office. Mr. G. Glover—or as he is sometimes called Dr. Glover—was five or six years since surgeon to the police force in Edinburgh, in which situation he came into collision with the Lord Provost and the Town Council, and his retirement was the consequence. He was subsequently employed by his brother as his traveller to collect orders, and latterly he has had charge of a branch depôt for the sale of dry meters in Manchester. As the 8th section of the Sale of Gas Act prohibits any person employed in making, repairing, or selling meters, from holding any office under the Act, Mr. George Glover has, we believe, resigned his charge of the depôt for the direct sale his brother's meters, to render himself eligible to hold an appointment that might give him the power of extending the sale of those meters indirectly. There can be no doubt that the appointment of anyone so connected with the trade would be very unsatisfactory to meter manufacturers generally, and to gas companies also.

It would, on many accounts, be desirable that there should be one or more supervising inspectors to examine and adjust the instruments supplied to the meter inspectors in the country, and to ascertain whether they know how to use them properly; but it is essentially necessary that the individual so appointed should be a gentleman of high character, of competent scientific knowledge, whose judgment can be fully relied on, and who is entirely free from the suspicion of partiality or of party influences. Such an officer, in addition to his ordinary duties, would be found extremely valuable in settling any disputes that might arise; and, if he possessed the confidence of the public, much, if not all the litigation provided for by the Act, might be avoided. On the contrary, the advantages to be derived from the appointment of such an officer would be marred, if not entirely destroyed, if there were any known influences operating to warp his judgment or to expose him to the charge of partiality.

Mr. Rutter, who is well known as the author of many useful publications that have served to remove prejudices against gas lighting, and to point out its advantages, has just brought out another small work, "On the Sale of Gas to Street Lamps, and the Right to Lay Mains, &c." The principal object of this pamphlet is to expose the fallacy that gas companies derive an unfair profit from the supply of the public lamps, and he endeavours to show that £5 paid for public lamps consuming 21,970 cubic feet per hour, leaves the price paid for the gas only 4s. $1\frac{5}{32}$d. per 1000 feet. Mr. Rutter suggests, as the only means of removing public dissatisfaction, that the gas should be always burned by meter, and he prefers the dry meter for the purpose. On the subject of laying down mains, he speaks strongly against the obstructions offered to gas companies. He proposes to free all those companies who are empowered by Parliament, from the vexatious restraints of local authorities; and on behalf of those who have not the sanction of the Legislature, he suggests that they should be placed under Parliamentary control by "a short and inexpensive process." Mr. Rutter will be glad to learn that his valuable suggestion has been anticipated by Mr. Craufurd, the member for the Ayrshire boroughs, who is, we understand, preparing a bill to remove the present anomalies and causes of dispute between gas companies and local authorities. We may say, in conclusion, of Mr. Rutter's book, that it contains much good matter, but it is, unfortunately, diffused through such a wilderness of words, that we fear few but those who are greatly interested in the subject will have patience to ramble through the maze to find it out.

We purpose to reprint in our next number the Share List of Gas Companies, and for the future to repeat it once every three months. We shall, therefore, be obliged by our readers pointing out any change which may have taken place in the paid-up capital, dividends, or value of the shares since the publication of the last list on the 17th of January last. We have prepared a similar list of Water Companies, and only await an opportunity to insert it.

A correspondent requests us to make further inquiries respecting the "New Artificial Gas" described in the *Photographic News*, and copied into many other periodicals; but, as no indication is given of the *modus operandi* by which superheated steam and coal tar can be converted into permanent gases of the quality stated in the paragraph, and as no name is given by which we could trace the nature of the invention if patented, the natural curiosity of our correspondent cannot be gratified. Some years since, Mr. Lowe took out a patent for making water gas, by decomposing superheated steam, and Mr. Barlow, at a late period, attempted to improve upon Mr. Lowe's idea; but the cost of the fuel consumed in heating and decomposing the steam, exceeded the whole cost of materials, wear and tear, labour expended in and manufacturing coal gas; and hence, after a heavy outlay had been incurred, the scheme was pronounced to be a failure, and was abandoned.

Correspondence.

THE ASTRONOMER ROYAL'S CUBIC FOOT BOTTLE.

Sir,—I write this letter (trusting to your impartiality to insert it) in reply to some remarks made by Mr. Sheridan, M.P., a member of the deputation from the gas-meter manufacturers to the Treasury, on the 9th instant.

He states, "that some person in the Old Jewry was employed, who is not a gas-meter maker at all, and never had any experience with these machines"—alluding, not to the machine known by the public as a gas-meter, but to the copper cubic foot measure constructed under the Act. He further goes on to state that, "not being able to make the bottle himself, he employed some one else in Smithfield; and so the machine has gone the round of the trade before the bottle was produced." Now, as he concludes by saying, "I may be wrongly informed," and as he most certainly has been, and, moreover, such statements are calculated to do me much injury, I feel bound to correct them.

The application to me was not to make a gas-meter, viewed as a machine, but simply to construct a measure of capacity capable of containing mathematically a cubic foot. This, I maintain, I have done, and of a form of all others the most fit for general adoption.

Now, as to my pretensions and education for such a task, I would state that, for thirty years, I was with the late R. B. Bate, and that during that time much of the mechanical work of constructing and

adjusting the standard weights and measures of the kingdom fell upon me, and in which I was instructed and overlooked both by my late employer and also by Captain Kater; that I was employed with them in the construction of the new Government standards in 1825, when the imperial bushel was made, and adjusted by us to within 10 grains troy.

Since Mr. Bate's death, I have been employed almost exclusively upon the Excise hydrometer and saccharometer—instruments whose first and essential requirements are perfection of bulk. I have also had the honour, during this time, of constructing the models of the decimal weights deposited at the Exchequer as the national standards; and, moreover, the weights of most of the cities of England have been corrected by me.

I think, Sir—taking all this into consideration—you will admit that Mr. Sheridan was wrongly informed when he implied that I was not competent.

Then, with regard to the employment of some coppersmith to do some part of the work, no person the least acquainted with such matters would, for a moment, suppose that any mathematical instrument maker would employ his own men upon actual coppersmiths' work, any more than that he would expect a coppersmith capable of finishing the adjustment of such a vessel as the one in question; indeed, I might almost as reasonably have been expected to smelt the copper employed in its fabrication.

The mere vessel was, therefore, given out to a good and experienced workman to be brazed together, but all the fittings and adjustments were done by myself. As to how such work has been done, I will leave to the decision of those who have these measures in their possession.

E. W. Ladd.

1, *Old Jewry, E.C., March* 22, 1860.

SUPPLY OF PUBLIC LAMPS BY METER.

Sir,—A pamphlet, by Mr. J. O. N. Rutter, on some of the "vexed questions," is a valuable publication at the present moment.

With regard to one of them—the supply of gas to public lamps—I had already, in a small town (the gas-works in which are in my possession), acted upon the principle of supplying them by meter, so strenuously advocated by Mr. Rutter; and the following is the way in which the arrangement has been carried out:—

There are about 70 public lamps. Six 2-light dry meters are fixed at the bases of 6 columns, and are so distributed as that, in lighting and extinguishing, as well as in respect of pressure, the mean of the 6 represent the average consumption of each of the whole number.

The burners are all of one size, and the cocks are turned on full.

The commissioners of the town keep everything in repair from the foot of the column, and light and extinguish.

The cost of the meters, and connecting them, was equally borne by myself and the commissioners.

The price of gas to private consumers is 6s. 8d., and to the public lights 4s. 6d. per 1000 cubic feet.

The quantity of gas registered by the meters is taken monthly.

The charge of 4s. 6d. per 1000 cubic feet to the public lights, when that to the private consumer is 6s. 8d., is too low; but, in this particular case, the difference between the price I agree to take and what otherwise would be fair, is part of the purchase-money of the works—at least, I look upon it as such. My own opinion is that, if the lowest price charged to any consumer were charged for the public lights, it would be fair; and I cannot see why the latter should be charged at less.

If every lantern be looked upon as a consumer, and requiring a service-pipe, then it is usual to charge the *highest* sum charged for gas; but, inasmuch as a district, or city, or town, guarantees a great number of such small consumers, which, in the aggregate, consume a large quantity of gas, it is, perhaps, right to give them the same benefit, as if all the gas were taken through one service.

I cannot but think that, if this plan of supplying gas to the public lights by meter were generally carried out, and under proper agreements and regulations, the "charge per lamp" would soon cease to be one of the "vexed questions."

Geo. Bower.

St. Neot's, March 20, 1860.

Register of New Patents.

1954.—Thomas Craven, of Scarborough, plumber, for "*Improvements in ball-cocks or valves.* Patent dated Aug. 27, 1859.

This invention relates to the arrangement and construction of float and ball-cocks or valves, such as are ordinarily used for regulating the height or level of water in cisterns and fluid holders of various kinds. The shell or case of the improved valve is in three parts or sections, screwed together either by screwing one inside the other, or by screws and flanges. The water inlet is by a short horizontal branch upon a projecting perforated grate, terminating in the widened portion or largest cylinder, in which, and at the junction of the two, is the valve seat. This seating consists of a slightly elevated or projecting annular piece, rounded on its outer edge, and answering as the valve surface for the operation of an elastic disc of caoutchouc or other material, which, when pressed fair upon the annular seat, entirely prevents the increase of water from the inlet branch into the expanded shell. The water-way from the shell consists of a short vertical and lateral, or transverse branch pipe, by which the entering fluid is discharged into the cistern. The other section or portion of the shell, consists of a plain horizontal cylinder, bored out true, to receive a turned cylindrical piece of metal, forming the spindle and guide-piece of the valve. This cylindrical piece has upon its front the valve end and small disc facepiece, to which is screwed the elastic disc for the valvular action; and, when the valve is put together, this elastic face works in the interior of the expanded portion of the shell, and has full command over the projecting annular face hereinbefore referred to. The outer end of this cylindrical piece has fitted to it a short spindle, the axis of the two being coincident; and upon this spindle is a helical spring, adjustable by an end cap-piece screwed upon the outer end of the main external shell on that side. In this way, by turning the end cap either way, more or less elastic resistance can be given to the valve. The lower side of the section of the main shell, containing the cylindrical valve-piece, is slotted through, and this slot is embraced by a double eye or bracket-piece carrying the stationary centre on which the floating ball-lever works. The upper end of this lever is cranked, so that its terminal portion stands vertically, or thereabouts. Its centre of motion is at the point where the main portion of the lever joins the short, straight, or vertical piece, the extreme end of which is rounded off and entered through a slot in the external shell into a corresponding slot in the internal cylindrical valve-piece. In this way, the ball-float rises and falls with the water level, and closes or opens the water-way.

The claims are for—

1. The general arrangement and construction of ball-cocks or valvular apparatus for controlling the flow or passage of liquids as described.

2. The system, or mode, of controlling or regulating the flow of liquids by means of cocks or valvular apparatus, in which the horizontally-acting valves are moved up to or away from vertical seatings by means of floats, the closing of the inlets being further insured by the pressure of a spring on the valve-spindle, as described.

1981. Robert Beverley, of Leeds, gas-meter maker, for "*Improvements in wet gas-meters.*" Patent dated Aug. 31, 1859.

This invention relates to certain peculiar constructions and arrangements of the water supply pipes or vessels of cast iron or tin wet gas-meters, whereby the fraudulent abstraction of unmeasured gas, and the tampering with the proper water level of the meter through the water-supply pipe, is prevented.

In carrying out this invention, it is proposed, according to one modification, to turn up the bottom end of the water-supply pipe either below or up to the proper water line, and to apply to the end so turned up a spherical or other valve, opening outwards into a chamber capable of admitting the water into the meter when supplied therewith, but of closing and effectually preventing the exit of gas, or the water from being forced out under pressure through this supply pipe, should any fraudulent attempt be made to abstract gas or water through that medium. These pipes may or may not be enclosed by a partition, descending to within a short distance of the bottom of the meter.

According to another modification, the ordinary straight water-supply pipe may be used, but provided at its lower end with a valve, fitted to one end of a short lever, the other end of which carries a weight or a float, which will also tend to keep the valve closed, and prevent the passage of gas through it, whilst the supply of water through the pipe is unimpeded.

A third modification consists in dispensing entirely with the water-supply pipe, and using only a feeding nozzle, provided with a valve at its lower end, on the spindle of which is fitted a float, supported by the water in the meter: this valve and float are enclosed by a partition, descending from the upper part of the meter to within a short distance of the bottom thereof; a second partition extends from the bottom of the meter up to the true water-line, and is placed a short distance outside the first-mentioned partition. On an attempt being made to abstract gas through the water-supply nozzle, by previously blowing down the gas inlet-pipe, the level of the water contained in the space enclosed by the partition above referred to, will be elevated and, the consequent rising of the float will close the valve in the bottom of the nozzle.

According to a fourth modification, the water-supply nozzle opens into a closed box, in the upper part of the square box, in the front part of the meter; which closed box communicates by means of a hole made in the partition which separates the body of the meter from the front part of the meter, with a passage fitted inside the body, and provided with a valve. If found desirable, the gas outlet pipe may be fitted over the closed box, and communicating by a suitable aperture with the body of the meter. In order to obstruct the introduction of a cotton wick or syphon into the ordinary water supply pipe of gas-meters, for the purpose of abstracting the water thereby, it is proposed to make a double elbow-bend in such pipe above the water level.

The claims are for—

1. The general combination of parts, constituting the improved wet gas-meter, as described.

2. The application and use to and in the water supply pipes, passages, or feeding nozzles of wet gas-meters, of valves opening upwards into the meters, in the manner and for the purposes described.

3. The peculiar constructions and arrangements of apparatus for admitting water into wet gas-meters, and preventing the fraudulent abstraction of gas or water therefrom, as described.

2002.—John Kippen Watson, of Edinburgh, gentleman, for "*Improvements in gas-meters, and exhausters, washers, and purifiers.*" Provisional protection only obtained.—Dated Sept. 2, 1859.

This invention relates to the arrangement and construction of gas-meters and exhausters in such a manner as to secure great simplicity of parts and economy of cost, together with facilities for inspection and adjustment, and other advantages. The revolving drum or cylinder of the meter is constructed in the ordinary manner of wet-meter cylinders, but it has no external gas casing. Each side of the cylinder is formed with a convex cover, or false end. The inlet pipe passes through the centre of this false end, or cover on the inlet side, and is turned up to the required height in the interior in the usual manner. The gas passes through the cylinder, and is received into the corresponding cover or false end on the opposite side or end of the cylinder, which is fitted with a gas discharge pipe in every way corresponding to the gas inlet pipe, the re-

ceiving end being turned up inside the cover, and then passed out by a central aperture. In this way, the gas is both received and discharged at the centre of the cylinder. For large meters, such as for stations and large establishments, this apparatus may simply stand in an open vessel of water filled with the fluid to the required height. But, for domestic purposes, on the smaller scale, a cover is necessary, simply for screening the apparatus, but not for retaining the gas.

As an exhauster, the apparatus is constructed in a precisely similar way, the cylinder being simply actuated by any suitable moving power, so as to draw the gas into it and force it out of it. The arrangement, or a modification of it, may also be applied to washers and wet-lime gas purifiers.

2052.—JOHN HENRY JOHNSON, of 47, Lincoln's Inn Fields, London, for "*Improvements in cocks and valves.*" A communication. Patent dated Sept. 8, 1859.

This invention relates to a peculiar construction and arrangement of cocks and valves, for regulating the passage either of steam, gas, air, or fluids; and consists in substituting for the ordinary stuffing-box, a thin disc or diaphragm of metal, or other suitable material, such as vulcanized india-rubber, gutta-percha, leather, or horn, in combination with a helical spring, which disc is secured firmly at its edges, whilst its centre is perforated, to allow of the passage there through of the spindle of the valve, which it is made to embrace tightly at any convenient and suitable part thereof. The elasticity of this disc or diaphragm, and spring, admits of the valve-spindle rising and falling freely, when closing and opening the valve. The helical, or other spring, is made to act directly or indirectly upon the valve-spindle, for the purpose of keeping the valve closed.

It is obvious that these improvements may be applied to all forms of cocks or valves wherein a conical or flat disc and spindle are employed for closing the orifice. The valve-cock, constructed on the principle above referred to, may be used as a fluid pressure regulator, by suitably adjusting the strength of the helical spring.

It is obvious that, in lieu of a metal diaphragm or disc, a diaphragm of any other suitable material may be used, such, for example, as vulcanized india-rubber, gutta-percha, leather, or horn, and, in general, any diaphragm of sufficient thinness and elasticity to admit of its being bulged in either direction in the centre, and returning to its original position again, without its periphery being moved.

If found desirable, the disc may be bulged or grooved before being inserted into its place, so as to enable it to give freely when subject to a central pressure in either direction. The edge or circumference of the diaphragm, should in all cases be held and firmly secured between two surfaces, either directly or through the intervention of rings or washers of leather, caoutchouc, or other suitable material.

The claims are—

1. The general construction and arrangements of cocks or valves, as hereinbefore described.

2. The peculiar combination of valve spindle, helical spring and elastic or flexible disc, or diaphragm, in valves or cocks as described.

2055.—THOMAS WEBSTER ALLSOPP, of Castle Donnington, in the co. of Leicester, for "*Improvements in portable gas apparatus.*" Patent dated Sept. 8, 1859.

This invention consists in the arrangement and combination of parts, constituting an apparatus for the production of gas, efficient, and at the same time portable and readily fixed, and adapted for the purpose. In this apparatus the hydraulic main, washer, and condensers are arranged in one part of the apparatus, while the retort, purifiers, and gasholder are in separate parts, and suitably connected with the former, for the purpose required, and so as to be readily connected or disconnected for fixing or removal.

This improved apparatus stands without fixing to walls, and simply requires a suitably level floor for its erection, and its erection may be quickly effected, and gas obtained in a few hours.

The claim is for the arrangement and combination of parts herein described, constituting a portable gas generating apparatus, and in particular the combination and arrangement of parts constituting the hydraulic main condenser, and washers as described.

2096.—NATHAN DEFRIES, of 5, Fitzroy Square, London, gas engineer, for "*Improvements in gas-meters.*" Patent dated Sept. 14, 1859.

This invention has for its object improvements in gas-meters. For this purpose, in place of admitting the gas directly into the small upper compartment, or valve box of the outer, or front chamber, and over the valve, the gas is admitted from the supply pipe, into a pipe which descends below the valve so that the gas passes into the small compartment or box from below the valve, and tends to keep the valve open. The lower end of the descending pipe dips into and is closed at its lower end by the water in the outer chamber. The gas is conveyed from the small upper compartment or box, directly by a pipe into the measuring chamber of the meter, without entering the outer or front chamber thereof, and the float in the outer chamber is arranged to close the valve in the small upper compartment or box in the event of the water in the outer chamber falling too low, as in meters of the ordinary construction, and there is an ordinary overflow pipe in the outer chamber by which the water level in the meter is regulated.

In some cases, in place of this arrangement, the gas is admitted as heretofore, into the small upper compartment or valve-box, and escapes therefrom by a descending pipe below the valve, the lower end of which descends into and is closed by the water, in the outer or front chamber, and the gas is conveyed by a branch pipe from the descending pipe into a chamber, formed by dividing off a portion of the outer, or front chamber, by a partition, through or under which there is a free water communication, and the gas passes from this chamber by a suitable passage into the measuring compartment of the meter. Thus the gas is excluded from the division of the outer chamber of the meter, containing the float which acts on the valve, and through which the gas is first admitted.

When the gas is admitted, as heretofore, from the small upper compartment, or valve-box, into the front chamber, then, in order to prevent the meter being tilted, a descending pipe is used below the valve, in which pipe there is an opening or openings, just above the proper water level in the outer, or front chamber, which opening or openings are closed by the water, in the case of the meter being tilted.

In the specification of a former patent, the patentee has described an invention which consists in a peculiar arrangement of apparatus for supplying water, to make up for any which may be evaporated or otherwise removed from the meter, and an additional water-vessel was employed for that purpose. Now, a part of the present invention consists in applying a more simple and convenient apparatus for supplying such extra water vessel with water, and the same consists of two valves on the same axis, one at the upper part of the water vessel and another at the lower part thereof, and arranged in such a manner that when the lower valve is opened to admit the water to flow to the meter, the upper valve shall be closed.

The claims are for—

1. The arrangement herein explained, whereby the gas is admitted below a valve into the valve-box, with a tendency to lift the valve or into the valve-box, as heretofore, and is then conveyed directly into the measuring-drum, or wheel, by a pipe, the lower end of which is closed by water, as described.

2. The mode of supplying water to an extra water-chamber and to the meter to which it is applied, the meter water-chamber receiving its supply of air from the outer atmosphere, as herein described.

2107.—NATHANIEL HECKFORD, of Forest Gate, Essex, gentleman, for "*A method of purifying the Thames and other rivers, and of treating night soil.*" Provisional protection only obtained. Dated Sept. 16, 1859.

This invention consists in the introduction of sea water into the Thames and other rivers, forced by power and delivered at two or more parts or points—say, for the Thames, at Chelsea and Blackfriars. Night soil is treated by introducing sea-water into cess-pools, or other receivers, from which the soil is led into some sewers other than the river, and through drains or channels made for that purpose. The soil is subsequently collected, and applied as manure; its fertilizing properties being increased by the mixture, therewith, of sea-water.

PROVISIONAL PROTECTION

HAS BEEN GRANTED FOR THE UNDERMENTIONED INVENTIONS.

268.—WILLIAM INGHAM, of Armley, in the co. of York, tanner, and WILLIAM HINCHCLIFFE, of Armley, mechanic, for "*Improvements in apparatus for applying steam and other vapours, gases, or fluids to the production of motive power, and which may also be used for a pump or gas exhauster, or other similar purpose.*" Feb. 2, 1860.

404.—JOSEPH ARNOLD, of the Leys, Tamworth, in the co. of Stafford, for "*Improvements in the treatment of sewerage matters for the manufacture of manure, and in the apparatus for the same.*" Feb. 14, 1860.

573.—DAVID CHADWICK, of Salford, in the co. of Lancaster, gentleman, and HERBERT FROST, of Manchester, engineer, for "*Improvements in apparatus for measuring water and other liquids.*" March 1, 1860.

579.—JOHN HENRY JOHNSON, of 47, Lincoln's-Inn-Fields, London, and 166, Buchanan Street, Glasgow, gentleman, for "*Improvements in gas regulators or governors.*" A communication. March 1, 1860.

619.—GEORGE WALCOTT, of 24, Abchurch Lane, City of London, civil engineer and contractor, for "*An improved receptacle or receptacles for generating gas.*" March 7, 1860.

635.—GEORGE SHEARMAN, of Haggerston, in the co. of Middlesex, gas-meter manufacturer, for "*Improvements in water gas-meters.*" March 8, 1860.

677.—JAMES SIM, of Aberdeen, N.B., manufacturing chemist, for "*Improvements in measuring and registering the flow or discharge of liquids.*" March 14, 1860.

681.—WILLIAM THOMAS CHEETHAM, of Rochdale, Lancaster, mechanical draughtsman, for "*Improvements in cocks or taps.*" March 14, 1860.

NOTICES HAVE BEEN GIVEN OF INTENTION TO PROCEED WITH THE UNDERMENTIONED INVENTIONS.

2501.—CHARLES BACON, Esq., of Edgeware Road, London, for "*Improvements in globes and shades for gaslights and oil or other lamps.*" Nov. 3, 1859.

2551.—JOHN DALES, of 11 and 12, Gresham House, Old Broad Street, London, for "*Improvements in applying deodorizing fluids to sewers and other receptacles of sewerage.*" Nov. 9, 1859.

2588.—CHARLES CHALMERS, of Merchiston, Castle Bank, Morningside, Edinburgh, N.B., gentleman, for "*Improvements in gas-stoves for heating buildings, apartments, and other similar places.*" Nov. 16, 1859.

2655.—THOMAS LISTER, of Sheepbridge Iron-Works, Chesterfield, Derby, engineer, for "*Improvements in the construction of sanitary privies and water-closets part of which improvements is applicable as a tap for drawing off liquids.*" Nov. 23, 1859.

549.—MAGNUS MANSON, of Edinburgh, N.B., gas-meter maker, for "*Improvements in gas-meters.*" Feb. 28, 1860.

Parliamentary Intelligence.

SALE OF GAS ACT.

HOUSE OF LORDS, MARCH 16.

Lord REDESDALE: My Lords, I beg to lay upon the table of your lordships' house a petition from the gas-meter manufacturers of Great Britain, praying for inquiry into the cause of the delay in carrying out the provisions of the Act passed last session for regulating measures used in sales of gas. Your lordships are aware that an Act was passed in the last session, one of the provisions of which was, that models of gasholders should be deposited in the Exchequer Office. Six months have elapsed since the passing of that Act, and no such models have been deposited in the Exchequer Office. The time has now arrived at which inspectors, for testing meters, ought to be appointed throughout the country, and none can be appointed, because there has been no gasholder deposited upon which reliance can be placed. In consequence of this state of things, the gas-meter manufacture is almost at a stand-still. The manufacturers hardly know what is likely to be done, and they therefore wish to ascertain, if possible, what course the Executive intends to pursue. As far as I am able to judge, by statements which have been

made to me, the difficulty has arisen from the extreme care—I have no doubt that is the reason—which has been displayed by the Astronomer Royal in the proceedings which he has taken, with regard to determining the proper manner in which the measurement should be applied. It seems that the Act required that an instrument, called a "gasholder," should be deposited in the Exchequer Office, fitted with proper balances, for the measurement of gas. It is an instrument pretty well known in the country—it is an instrument by which all meters are tested. It is perfectly adapted for this purpose, and is admitted to be so in the report of the Astronomer Royal; but, I understand, that gentleman has been induced to set about the introduction of another instrument, which, in the first instance, he called a "transferrer;" but, which is quite unfitted for the purpose of testing the meters themselves. Then, looking at the Act after this instrument was deposited in the Exchequer Office, and, finding that it was directed that the "gasholder" was to be there deposited, the Astronomer Royal seems to have changed the name of the instrument. The consequence is, there is no such instrument as a gasholder as yet deposited in the Exchequer Office, or any means for the proper mode of measuring gas; and, as yet, apparently, there are no immediate steps taken to supply the deficiency. I think it not at all impossible that some difficulty may arise from a model of any kind being deposited under the name of a gasholder, which, in reality, is not a gasholder. I may say that this petition comes from the whole body of gas-meter manufacturers of the country, though it is only signed by the chairman of a large meeting. They say that they believe the provisions of the Act are quite sufficient for the purpose stated in this petition; and I am also inclined to think, from what I have heard on other occasions, that there is little difficulty in carrying out the measure under the machinery that already exists, if the instructions with regard to that Act had been exactly fulfilled. They state one thing, which I may mention, because it is a question I have heard from other quarters, namely, that a difficulty is apprehended, from the possibility of the gasholder, required by the Act to be deposited, being injured in travelling about in different places; but they do not apprehend, practically, any difficulty to arise from that source. I hope that the Government will be enabled to state what course will be pursued on the subject, because, in twelve months from the passing of the Act, no gas-meter can be erected anywhere, unless tested and stamped; and, unless means are provided for testing it, no gas-meter can be erected. Therefore, it is absolutely necessary that some very rapid decision should be taken, and some definite course pursued.

The Duke of NEWCASTLE: The Act to which the noble lord alludes directs the Treasury, and under the Treasury the Exchequer Office was appointed, to execute the Act. The Treasury conferred with the Astronomer Royal, and he made certain objections with reference to the gasholder which had been deposited at the Exchequer Office. Under these circumstances, the Treasury consulted the Board of Trade, as to whether the Act would not require amendment; and the Board of Trade, having considered it carefully, have come to the conclusion that no amendment to the Act is necessary, but that it is desirable to carry it out into practice. Under these circumstances, they are in communication with the Treasury, with a view to commence the performance of those duties; and I have reason to hope that, before very long, we shall be able to come to some arrangement, by which the difficulty of which the petitioners complain may be overcome.

Lord MONTEAGLE (who quoted from the report of the Astronomer Royal on the subject, and who was inaudible almost throughout his speech) was understood to say that he very much apprehended there would be disappointment unless there were an alteration in the Act; and that, of all things in the world, this subject was one upon which there ought to be no doubt or imperfection in the wording of the Act.

Lord REDESDALE: Although I think that, in some respects, the wording of the Act might have been improved, yet it is my opinion that the objections of the Astronomer Royal are open to a complete answer. With regard to the difficulty in this case, being one not easily to be solved, the measurement of gas and the establishment of meters are carried out in foreign countries—both in Berlin, and Paris, and throughout Prussia—and, if they are able to apply a test, why should not we in this instance? This is purely a question of the possibility, or impossibility of applying a measurement to an article which is sold altogether by measurement. It is impossible, therefore, to say that this is not a question which becomes a public matter altogether, and which requires serious attention both of the Government and of the various communities throughout the country. I believe the noble duke has stated the right course. The Act will work, but I do think it is impossible to predict what the event may be, until it is attempted to put it much more in working than it is at the present time. In anything which is new, you will rarely ever detect what requires remedy until it is practically employed.

HOUSE OF COMMONS, MARCH 16.

Mr. H. B. SHERIDAN rose and said: I wish to ask a question of the right honourable gentleman, the President of the Board of Trade—"Whether the Lords of the Treasury are now prepared to carry out the provisions of the Sale of Gas Act, and to have the 'gasholder' at once deposited at the Exchequer-Office?" This, Sir, is a most interesting question to the House, because it is a most interesting question out of doors. (Hear, hear.) At this late hour of the evening, when there has been so much conversation on the motion for adjournment, I will abstain from any lengthened remarks. An Act of Parliament was passed in the last session, entitled the Sale of Gas Act, which had for its object the better regulation of the measuring of gas in warehouses, manufactories, and other places. The sole object of that Act of Parliament was to obtain a better system of measurement with reference to the gas supply. Now, Sir, the system which was proposed by that Act to be introduced was to appoint inspectors throughout the country, adopting, as nearly as possible, the system laid down by the Weights and Measures Act—to appoint inspectors throughout the country, whose duty it would be to inspect the meters in use at the different works, to see whether they were correct, and, after testing them, to stamp them as soon as they were satisfied with the correctness of the meter. In order to enable the inspectors to carry out the provisions of the Act, it was provided that an instrument called a gasholder was to be the instrument with which to test the meters. But, in order to arrive at a proper conclusion as to the accuracy of the instrument to test the meters, it was provided, in the third section of the Act of Parliament, that the Treasury should deposit at the Exchequer-Office a model gasholder, which was to be retained as the model of the gasholders throughout the country. That provision, required by the third section of the Act to be carried out, has not been carried out; the gasholder has not been deposited in the Exchequer-Office, and the whole country is in a state of great excitement with reference to the question, and is quite unable to decide what may be the view of the Government with reference to that clause of the Act of Parliament. It appears that the meter-making trade of the country is at a stand-still, because they are unaware of the intentions of Her Majesty's Government. It has been said that further legislation is necessary to give full effect to the Act of Parliament, and a deputation of gas-meter makers, and gentlemen from various parts of the country interested in the carrying out of the Act (and it would be difficult to find a part of the country not interested) have been in London, and have held several meetings, and advertised the result. The public meetings appointed a committee to confer with Her Majesty's Government, and a deputation has waited on the Treasury in order to ascertain, if they possibly can, what are their intentions in reference to compliance with this Act. Now, Sir, it appears, or did appear rather, from what took place, the only objection made by the Treasury was, that in some part of a report by the Astronomer Royal, it had been stated that great doubts were entertained by him with reference to the applicability of the Act of Parliament, which required the model instrument to be transported from the place of manufacture to the place where it was destined to be used. This was stated to be the doubt of the Astronomer Royal, and, in consequence of this doubt, the whole Act of Parliament, and the operations under it, have been positively and peremptorily suspended. (Hear, hear.) We have conferred with the Astronomer Royal; we have conferred also with the Under-Secretary of the Treasury, as to the best means of curing the supposed evil. He thought it was too obvious that the gasholder, which was to be deposited in the Exchequer Office, might be deranged on being sent into any part of the country. The opinion of the deputation was unanimously expressed to the contrary effect. (Hear, hear.) They said that this instrument, called a "gasholder," and which, I was told, was an instrument unknown, that this was an instrument, the whole trade asserted, throughout the country, was used by every gas company in existence, and was so well known, that even medical men used it to test the efficiency of the lungs, and which the Astronomer Royal, if he had any knowledge on the subject, would have no difficulty in stating was an instrument sufficient to effect the object in view. (Hear, hear.) It appears, the Lords of the Treasury were called on, by Act of Parliament, within three months, to lodge the instrument at the Exchequer Office. They have neglected entirely to carry out that arrangement of the Act, because the Astronomer Royal thought the instrument might be deranged; and the whole thing has been in continual suspense, in consequence of his doubt. Every Town Council, and nearly every Quarter Sessions, are required by the Act to decide whether they will adopt the Act, whether they will appoint inspectors, and whether they will not proceed at once to test the correctness of the gas-meters that are employed in their respective localities. But having appointed inspectors in some instances—having gone through the ceremony of adopting the Act (which seems something very farcical)—and, having no means to employ the inspectors, they have sent to inquire why it is there is no model at the Exchequer Office by which to test the meters intended to be verified and stamped; and we find the whole delay has arisen, as before stated, simply upon a doubt of the Astronomer Royal that the instrument might possibly get a little out of order in its transmission from one place to another. I think this is a very grave question—(Hear)—and this objection is not sufficient to prevent the carrying out of this Act of Parliament; and I hope I shall get such a reply to my question to-night as will at once set at rest the doubt expressed at the Treasury with reference to the power that is vested in them to carry out this Act. I may add that, at the Treasury, we were told, by the officials, it was hardly within their province to carry out the Act, although it was true the Treasury should do certain things. The Treasury thought it was not their natural province to carry out this, which is a trading Act; and we were, in consequence, referred to the President of the Board of Trade. Although we got all the knowledge we could, the President of the Board of Trade said there was nothing in the Act of Parliament which gave them power to act. There is no doubt the Board of Trade is not referred to in the Act; and the only thing which induced the noble lord, who first introduced this bill, to place this responsibility on the Lords of the Treasury, was, that he followed as closely as practicable the provisions of an Act of a kindred character, the Weights and Measures Acts. Therefore, where the Act requires that the Treasury should do a certain thing, it is hardly right for the Treasury to shift their responsibility, especially as there is some doubt as to their right to shift it on to the Board of Trade. All we ask is that the Board of Trade should decide whether they will act in the matter, or not, or if the right honourable gentleman to whom I address myself will state, he does not feel himself justified in acting in the matter, then the honourable gentleman, the Secretary for the Treasury, will tell us whether it is, or not the intention of the Treasury to carry out the Act. (Hear hear.) I put that interrogatory in the hope of getting an answer to this much complicated question, and that the deputation may leave town, and know how to proceed. I, therefore, beg to ask whether it is the intention of the Treasury at once to order one of those gasholders to be deposited at the Exchequer office; and, if they think it is necessary, a travelling inspector should be appointed whose duty it would be to see that the testing instruments when deposited in the country, to be at the service of the inspector are correctly deposited there? If this be done, I think there are sufficient powers under the Act of Parliament, to which I refer the Lords of the Treasury to make such an appointment. If it is intended to hang up the Act of Parliament, on the doubt expressed by the Astronomer Royal, and to come to Parliament for fresh powers, all I can say is, such a course will cause great dissatisfaction. (Hear, hear.) All we ask is that the Act of Parliament may be tried, and if there be a defect in the Act, and if it be impracticable, then let Government come to the House, and, by a supplemental bill, correct the errors which in its working may be discovered. (Hear.)

Mr. MILNER GIBSON: With regard to this Gas Act, the Board of Trade is not charged with any powers whatever to carry it into effect. About a week ago, a communication was made by the Treasury to the Board of Trade, and my honourable friend was consulted as to the sufficiency of this Act for the object for which it was proposed. A deputation waited on me, as well as the Astronomer Royal, and a good deal of discussion took place as to the difficulties which present themselves in the possibility of carrying this Act out, from a defect, and the way in which it appeared to be worded. But, after consideration, we have come to the conclusion, so far as we are concerned, the Act does not require any immediate amendment, and that it may be carried into execution. (Hear, hear.) That opinion has been communicated to-day to the Treasury. So far as the Board of Trade is concerned, we have no powers whatever under the Act, no executive powers; and, therefore, having given that opinion as our view to the Treasury, the matter now rests with them to carry out. (Hear, hear.)

[For remainder of Parliamentary intelligence, see supplement.]

Miscellaneous News.

THE CARBURATION OF GAS.

By M. LEFEBVRE.

From *Le Gaz.*

The subject of which I am now about to treat, has almost become obsolete. The matter has been decided by the results of practice;

and, the various modes of naphthalizing gas having been abandoned, one after the other, that process is no longer adopted in gaslighting. Nevertheless, I think it will be useful to state the results of the experiments made by me at the period when carburation was introduced with unanimous approbation. Nothing, indeed, could be more alluring to the gas consumer. He was taken into a dark room, where a burner, supplied with the comparatively poor gas of the companies, gave so feeble a light, that he could not see to read at a distance of a few yards: then, all at once, the same burner gave a brilliant light, the letters became visible, and all that had been done to produce that effect was, to pass the gas through a bottle containing a few drops of liquid. The apparatus was very simple; the liquid did not become exhausted, and there seemed to be a direct saving easily made. But when, instead of carburating the gas for a single burner, it became necessary to extend the operation to ten, twenty, or a hundred burners, the question changed; the difficulties and dangers multiplied, and the difficulties increased more rapidly than the intensity of the light. On account of these drawbacks, the plan fell to the ground. We live at a time, however, when we should look indulgently on Utopian schemes, which may, some day or other, become practicable; and the genius of invention should always find, if not praise, at least attention, even in its wildest speculations.

The first question which it became necessary to consider, on entering into this inquiry, was the kind of naphthalizing apparatus that should be employed. There were so many, and, as laboratory experiments had proved that they all enriched the gas, and greatly increased its illuminating power, it appeared that the only difficulty arose from the embarrassment of choosing, when all were so good. My choice of naphthalizing apparatus being limited, I directed my attention, in the experiments I am about to describe, to ascertain the required physical conditions of the carburator for the several kinds of apparatus I had at command, or of which I had read. I perceived that all the inventors had entertained the opinion that the object to be attained was, to make the gas take up a large quantity of carbon vapour; and they endeavoured, by every possible means, to prolong the contact of the gas with the liquid. We shall shortly see what experience has determined in this matter; but theory alone was sufficient to condemn these attempts. Hydrocarbons emit vapours; the vapours mix with the gas, and that mixture must obey the ordinary physical laws which regulate mixtures of vapours and gas.

The effect depends, therefore, on pressure and temperature, and not on the quantity of liquid exposed to the action of the gas. A single fact shows this; it is, that the gas carries along with it mechanically, not only the vapour but, *particles of the hydrocarbon*. The following are the general arrangements that I adopted in my experiments:—

In the first place, I had an experimental meter furnished with its index; and, at the outlet, the gas might be sent, as desired, along either one or other of two pipes, each of which was furnished with a stop-cock. On opening one of the stop-cocks, the gas was carried directly to the burner of the photometer; and, on closing that one and opening the other, the gas passed through the naphthalizing apparatus. The first carburator that I used was a simple vessel fitted with tubes, through one of which tubes the gas was conducted just above the surface of the liquid, without touching it, and it escaped through the other tube to the photometric burner.

The photometer I used in all my experiments was M. Durands, with a rose-coloured gelatine eye-piece. I was well satisfied with it, after making some slight alterations. The sight-box was surrounded with a kind of chest, forming a funnel, which I had made of cardboard, and the interior was lined with unglazed black paper. This arrangement has the advantage of not exposing the flames to be tested, the rays of which fatigue the eye and disturb the results. A small copper rod, attached to the foot of the candle-holder, enabled me to vary the distances, without having an assistant. The burner I employed in nearly all my experiments, was a steatite batswing burner. Its consumption of gas per hour, tested with the greatest care, was 60 litres (366 cubic inches) with a pressure of 20 millimètres (8/10ths of an inch), at which pressure all my experiments were made.

In naphthalizing the gas by means of the apparatus above described, the first results obtained were:—

	Intensity without carburation.	With carburation.
Experiment *a*	2·77	4·93
„ *b*	2·87	4·93
„ *c*	2·87	4·93

I then substituted another carburator for the first one, which realized the conditions that inventors had desired to obtain. I took some tubes shaped like the letter U, such as are frequently used in chemical experiments for drying or absorbing gases. I filled these tubes with pumice-stone steeped in benzole, taking care that there should not be an excess of benzole to obstruct the passage of gas through the lower part of the tube which would have changed the pressure and caused the gas to *dance*. By uniting two such tubes, each 30 centimètres (about 12 inches) in height, the gas was compelled to traverse 1·20 metre (4 feet) of an atmosphere charged with carbon vapour. It is evident that no carburator to be used practically, could impart such a high degree of carburation. The following are the photometric results:—

Common gas.	Naphthalized gas.
2·68	5·90
2·77	5·90
2·87	5·90
2·87	5·90

It appears, from the foregoing experiments, that the pumice-stone carburator caused the gas to gain nearly the addition of one candle in its illuminating power compared with the other carburator. But a portion of the carburetting liquid might, in the latter experiments, arrive at the burner in the form of liquid particles and not of vapour; therefore, that mode of naphthalizing, though perhaps advantageous when the gas is burned close to the apparatus, might not have been superior to the other if it were carried to some distance, as would be the case in practice. Endeavouring to test this opinion by experiment, I first placed between the last pumice-stone tube and the photometric burner, a large glass vessel holding 2 litres (122 cubic inches), into which I had introduced a number of glass tubes for the purpose of arresting the liquid particles carried off by the gas; the gas being conducted to the bottom of the vessel and escaping to the burner from the top. The results were, that the naphthalized gas indicated an illuminating power of 5·, instead of 5·90, as in most of the experiments with the pumice-stone carburator.

There was still a slight difference in favour of the pumice-stone carburator compared with the other. To ascertain the consumption of benzole in the two, the pumice-stone carburator was carefully weighed, and I lighted the burner. When I had finished the experiment, the burner had consumed 93 litres (nearly 4 cubic feet) of gas. The carburator was then weighed, and the loss of weight amounted to 4·5 grammes (70 grains), which would be equal to a consumption of 4·83 grammes of benzole per cubic mètre of gas.

The same experiment was made with the carburator without pumice-stone. The consumption of gas during the experiment was 286 litres, the loss of weight was 12·50 grammes, which was equal to 43·7 grammes per cubic mètre of gas. The same experiments were repeated several times with nearly similar results; which proved that the pumice-stone carburator always consumed more benzole, and that the luminous intensity of the gas was not in proportion to the increased expenditure.

In order to approach more nearly to practical results, I substituted for the large glass vessel, a coiled lead pipe, ten mètres long, and ten millimètres in diameter. The first experiment gave the following average results:—

Common gas.	Naphthalized gas.
2·87	3·30

In making the last experiment, I was led to consider the effect of temperature on the illuminating power of the gas. In the preceding experiment, I had found that, in passing through ten mètres, (about 13 yards) of lead pipe, there had been a considerable diminution of the illuminating power. The pipe had been brought from a warehouse where the temperature was below 0° (32° Fahr.), and the photometrical observation had been made as soon as the two ends of the pipe were attached to the apparatus. On repeating the experiment, several hours afterwards, the laboratory having been maintained at a temperature of 15° (59° Fahr.), I found the illuminating power of the naphthalized gas had increased to 4·93, whilst the ordinary gas retained its former luminosity of 2·87. These experiments led to the following conclusions:—

1. The carburation of gas is completely effected the moment that it passes through a saturated atmosphere.

2. The temperature possesses an influence which requires to be considered.

Since the carburation is limited by the law of saturation, it is useless to endeavour to construct combinations of apparatus. A space of any kind saturated with carbon vapour, is all that is required. I therefore adopted in my succeeding experiments, an apparatus similar to the first one I had employed, with the addition of a reservoir with a syphon tube, to maintain the liquid at the same level. Instructed, however, by the result of the experiment with the lead pipe, in all subsequent experiments I determined with accuracy the temperature of the apparatus, which I maintained at 15° (59° Fahr.) centigrade. The following table shows the results obtained:—

Pumice carburator.	Common gas.	Surface carburator.
5·90	2·68	4·75
6·	2·77	4·75
5·87	2·68	4·70
5·87	2·68	4·80
5·90	2·87	4·75
5·87	2·87	4·75
5·90	2·87	4·80

On comparing these results with those obtained in the first and second series of experiments, it will be observed that the illuminating power given by the pumice carburator, had slightly diminished. These facts did not surprise me. Attributing to the pumice-stone method of carburation a mechanical action, which the temperature cannot affect, it was natural that it should have greater influence than the other carburator. At all temperatures, the gas can carry off liquid particles, but the saturation at all temperatures does not supply to the same volume of gas the same quantity of vapour.

After having established, as one express condition of the experiment, equality of temperature, it becomes interesting to observe the progress of intensity as the temperature increased. To do that, it was only requisite to place the naphthalizing vessel in a water-bath which was heated by a gas furnace, the water being continually stirred about with an agitator. A mercurial thermometer indicated the temperature, the starting point being Zero (centigrade). Nothing is more easy than to regulate the temperature with a gas furnace, and to maintain it stationary during the time of the experiments. I operated in this manner, at temperatures varying from five to five degrees (centigrade) successively. The following are the results obtained in several series of experiments with gas carburated on the surface of the liquid, and the burner used being steatite, consuming 60 litres per hour:—

Common gas.	Naphthalized gas.					
	0°	5°	10°	15°	20°	25°
2·68	3·0	3·0	3·30	4·9	5·5	5·45
2·68	3·0	3·0	3·30	4.9	5·6	5·60
2·77	3·0	2·9	3·13	4·9	5·4	6·00
2·68	2·9	3·0	3·30	4·7	5·4	5·60
2·77	3·0	3·1	3·13	4·9	5·4	5·60
2·68	3·0	3·1	3·30	4·9	5·6	5·60

Thus it appears the illuminating power increases with the temperature; and it must be so. But, if there be a considerable distance

between the carburator and the burner, it is evident that the advantage of temperature will be lost in the passage of the gas, and that a portion of the vapour mingled with it, will be deposited in the tubes. Other experiments were made with different burners and at the same temperature. With a union-jet burner, No. 5, consuming 109 litres (nearly 4 cubic feet) of gas per hour, the average results of eight experiments, which nearly coincided, were :—

Common gas.	Carburetted gas.					
	0°	5°	10°	15°	20°	25°
5·70	5·9	6·2	7·2	10·1	11·8	12·7

With a batswing burner, consuming 144 litres (about 5 cubic feet) of gas per hour, the average results of five nearly corresponding experiments were :—

Common gas.						
	0°	5°	10°	15°	20°	25°
7·20	7·7	8·0	9·0	9·9	10·4	12·2

After having made these experiments, I arranged another to convince myself of the influence which temperature had on the carburation. I applied the same vessel I had before used, but in this instance for the purpose of *decarburizing* the gas. I kept the carburator at the temperature of 15° centigrade, and the additional vessel at a temperature of 5°. With a batswing steatite burner, consuming 60 litres per hour, under a pressure of 20 millimètres, the average results of five experiments were :—

Common gas.	Gas carburetted at 15°.	Gas decarburetted at 5°.
2·77	4·8	3·5

Such a result needs no comment. It shows that the carburation should take place close to the burners, and that the cooling of the tubes afterwards should be avoided; for, without that, the effect is destroyed. If we compare the effect of the carburation at 5° with that of the gas *decarburetted* at 5°, it will be seen that they are nearly alike.

The carburator with the arrangement for keeping the liquid always at the same level, having given very satisfactory results in my experiments, I endeavoured to ascertain its effect on a large scale. [M. Lefebvre then attached six additional burners to his apparatus which consumed 780 litres (nearly 28 cubic feet) per hour, employing the same carburator. The photometric results were found to be very dissimilar; and, after making fifteen unsatisfactory experiments, he enlarged the size of his carburetting vessel to ten times its previous capacity, when the experiments closely agreed; the common gas being 2·80, and the carburetted gas 4·5, which nearly approximated to the former experiments with a single burner].

There unfortunately remains a gap to be filled up to complete this series of experiments. The want of time, of means, and the failure of my eyesight, prevented me from doing so. There remains to be determined, what is the *minimum* capacity necessary for the carburator, but the experiments ended here. I shall now therefore submit some considerations respecting the use of naphthalization, and discuss its advantages, its economy, and its inconveniences.

We have first to examine the relations subsisting between the intensities of the light of common gas and of naphthalized gas. On comparing all the experiments made in analogous conditions, that is to say with carburators without pumice-stone, the average relative intensities of common gas and of naphthalized gas were; common gas 1, and naphthalized gas 1·756; consequently, the carburation increases the illuminating power 75 per cent, and the standard burner if common gas equal to six candles, would in naphthalized gas be equal to 10·5 candles. Our experiments show that that law is correct. What then, is the evil of naphthalizing corresponding to that increase of intensity? We have observed that the quantity of benzoin absorbed with one carburator is 44·4 grammes (680 grains) per cubic mètre, which for a burner of 100 litres per hour, would be equal to 4·44 grammes, and the estimated cost of the benzole at 1·4 franc per kilogramme, would amount to 0·006 for a burner consuming 100 litres per hour, the intensity of which is calculated at 10·5 candles, so that the luminous value of the gas would stand thus :—

100 litres of gas at 30 centimes per cubic mètre	fr. 0·030
4·44 grammes of benzole at 1·40fr. per kilog.	0·006
	0·036

To obtain the same quantity of light from common gas it will cost—

175 litres of gas at 0·30 francs per cubic mètre	fr. 0·052
Difference in favour of carburation	fr. 0·016

This amounts to 16 centimes per cubic mètre of gas consumed; out of which the inventor would have to be paid, and the cost of the apparatus.

I must observe, however, that in practice on a large scale, such favourable results as those given in the experiments could not be obtained. The carburator would never be placed at so short a distance from the burners, nor would it be practicable to maintain an equality of temperature between the carburator and the gas pipes; therefore, the illuminating power of the naphthalized gas would not be so great as I have supposed. The results which have served as the basis of the preceding calculations, are those produced by the experiments conducted at a temperature of 15° centigrade. Suppose the temperature to be reduced to 10°, what then would be the result? The average of the luminous intensity of the experiments at that temperature was as 1 to 1·19; consequently, a single burner of common gas equal to 6 candles, would give a light of 7·14 candles, with naphthalized gas, and the relative cost of the two gases would be as follows :—

100 litres of gas at thirty centimes per cubic mètre	fr. 0·0300
4 grammes of benzole at 1·40fr. the kilog.	0·0056
	0·0356

The same intensity of light would be obtained by—

119 litres of gas at 30 centimes the cubic mètre . ..	fr. 0·0357

It may be objected that the estimate of the expenditure of benzole is excessive, because it is supposed in the two cases to be almost equal (4 grammes instead of 4·44 grammes).

It would be requisite to make additional experiments, to ascertain the consumption of the carburator at a temperature of 10° (50 Fahr.) but we can arrive at an approximation by assuming the quantities of benzole consumed to be proportional to the luminous intensities in the other experiments, and from that it appears that the difference in favour of the benzole would be very trifling.

The result of these experiments, therefore, shows that, if the carburation produces occasionally advantageous effects, they are due to the state of the temperature, and are consequently liable to great variations.

In conclusion, the question whether advantage is to be gained by naphthalizing gas, is far from being solved. To arrive at practical results, it is requisite :—

1st. That the carburation should take place near to the burners;

2nd. That the apparatus and pipes should never be at a lower temperature than 10° (50° Fahr.);

3rd. That the size of the carburator should be enlarged in proportion to the number of burners supplied;

4th. That the batswing, or the union-jet burners, only should be used.

Such, in my opinion, are the only conditions on which, the plan of naphthalizing gas can be carried on with a chance of success. I have done all that can be done with naphthalized gas in a laboratory. I know the field is open to inventors to apply it practically. I believe it is desirable that all commercial enterprises should, before being tried publicly, be thus subjected to the tests of the laboratory. Science is a heavy yoke, under which the boldness of the spirit of invention should pass. She restrains the strong as she helps the weak. We hope that, by this conscientious, if not able investigation, to have been useful to both.

LIST OF BOROUGHS THAT HAVE ADOPTED THE SALE OF GAS ACT, AND OF THE INSPECTORS APPOINTED.

Name of Borough.	Name of Inspector.
Abingdon	
Armagh	
Ashton-under-Lyne	John Buchanan
Bath	
Bedford	
Belfast	
Bideford	
Birmingham	Thomas Jackson
Blackburn	
Bolton	William Lyons
Boston	John Tonge, jun.
Bradford, Yorkshire	
Bridgenorth	
Brighton	
Bristol	Benjamin Kitt
Buckingham	
Bury St. Edmund's	Elisha Pechey
Cambridge	William Audley King
Canterbury	
Carmarthen	Samuel Kentish and Robert Wade
Chichester	Charles Everett
Chippenham	
Clitheroe	
Congleton	
Coventry	
Dartmouth	Valentine Butteris
Devonport	William Edwards Bartlett
Derby	
Dorchester	
Dover	
Droitwich	
Dublin	
Durham	
Exeter	Henry Phillips
Falmouth	
Glastonbury	
Gloucester	
Godalming	
Gravesend	
Great Yarmouth	Alfred W. Morant
Hartlepool	Francis Green Morris
Hastings	
Helston	
Hereford	
Hull	William Peasegood
Hythe	
Ipswich	
Kendal	
Kidderminster	
King's Lynn	Robert Barton
Lancaster	Henry Harrison
Leeds	
Leicester	
Lincoln	
Liverpool	Daniel Horton
Londonderry	
Louth	
Ludlow	
Macclesfield	William Lee
Maidstone	
Marlborough	
Monmouth	
Morpeth	Robert Bewick
Newbury	
Newcastle-on-Tyne	Robert R. Carr
Newport, Mon.	Conyers Kirby
Nottingham	
Northampton	
Penryn	
Penzance	

Name of Borough.	Name of Inspector.
Portsmouth	
Preston	John Newton
Reading	
Salisbury	John Champney Bothams
Sandwich	
Scarborough	Alexander Taylor
Sheffield	William Barlow
Stamford	Richard Ward
Sunderland	Thomas Coates
Tynemouth	Samuel Brittain
Wakefield	
Wallingford	
Warrington	Benjamin Payne Coxon
Warwick	
Wells, Somerset	
Winchester	
Windsor	
Wisbeach	William Adams
Wolverhampton	
Worcester	Thomas Davis
York	

THE CRYSTAL PALACE DISTRICT GAS COMPANY.

The ordinary Half-Yearly Meeting of this Company was held at the Albion Tavern, on Tuesday, the 13th of March, 1860—Mr. Erasmus Wilson in the chair.

The Secretary read the following report, and the accounts were taken as read:—

The directors have to report the continued satisfactory progress of the company's operations during the half year.

The works which were reported as in progress at the last half-yearly meeting, are sufficiently completed to be in active operation, and have been profitably employed during the winter in furnishing the increased supply required during the darker months of the year, and the additional demand made upon the company by the illuminations at the Crystal Palace. The building operations were for a short time retarded by the "Builders' Strike," but a temporary inconvenience only has resulted therefrom.

During the ensuing year, the directors anticipate that a further moderate outlay will be required for the extension of mains in the district, and the total completion of the works; and, to meet this outlay, they propose that proprietors holding the £2 paid shares, should have the option of paying those shares in full.

The directors who go out of office, by rotation, the present year, are, Mr. George Pearce Pocock, Mr. George Silvester, and Mr. Frederic Hetley, and these gentlemen, being eligible for re-election, offer themselves to the proprietors for that purpose.

The auditor going out of office the present year is Mr. George Fasson, and, being eligible for re-election, offers himself to the proprietors for that purpose.

The directors submit to the shareholders the accompanying balance-sheet, showing the financial position of the company. The accounts are made up to the 31st of December, and are duly vouched by the auditors. According to this account, it will be seen that the profits on the half year are £1539. 2s. 9d.; out of which sum the directors recommend the declaration of a dividend after the rate of 6 per cent. per annum, and the appropriation of the remainder as follows:—namely, to write off preliminary expenses, £100; parliamentary expenses, £100; land account, £100; and carry the balance, £74. 13s. 1d., to the profit of the succeeding half year.

Dr. *Capital Account, December 31, 1859.* *Cr.*

To amount for plant			£14,723	6	2	
Sydenham shares			8,724	4	6	
Mains			17,069	15	6	
Meters and services			2,193	13	8	
Office furniture			106	9	11	
Freehold land			2,329	9	7	
Preliminary expenses			3,584	13	1	
Parliamentary expenses	£625	3 3				
Less written off	60	0 0				
			565	3	3	
			£49,296	15	8	
Balance			3,169	4	4	
			£52,466	0	0	

By proprietors for paid-up capital—						
4077 shares, at £10 per share			£40,770	0	0	
923 ditto, £2 per share paid			1,846	0	0	
						£42,616 0 0
Loans						9,850 0 0
						£52,466 0 0

Dr. *Profit and Loss, Half Year ending December 31, 1859.* *Cr.*

To amount for coals carbonized			£3,376	16	6	
Lime and oxide			227	14	6	
Trade charges			163	11	5	
Rent, rates, and taxes			464	19	2	
Law charges			13	9	0	
Directors' and auditors' fees			265	15	0	
Salaries and collector's commission			278	3	2	
Wages			810	16	5	
Interest on loans			227	12	10	
Bad debts and allowances on collection			12	14	2	
Wear and tear off plant and mains			550	3	5	
Ditto off meters and services			103	9	11	
Ditto off office furniture			3	5	10	
Ditto off retort account			200	0	0	
			£5,698	11	4	
Balance			1,539	2	9	
			£7,237	14	1	

By balance unappropriated, June 30, 1859						£45 15 1
Gas rental	£5,847	0 9				
Meter ditto	100	0 1				
			5,947	0	10	
Coke made for sale			918	4	1	
Breeze ditto			22	1	0	
Tar ditto			30	13	3	
Sundries			1	10	6	
Sulphate of ammonia, net profit			17	10	7	
Dividend on Sydenham shares			228	14	3	
Interest, on deposit at bankers, &c.			26	4	6	
			£7,237	14	1	

Dr. *Balance-Sheet, December 31, 1859.* *Cr.*

To stock on hand			£1,338	2	1	
Amount due from sundry persons			2,047	16	4	
Rental and arrears			4,096	18	2	
Balance at bankers			541	19	1	
			£8,024	15	8	

By balance from capital account						£3,169 4 4
Amount due to sundry persons						3,316 8 7
Profit and loss						1,539 2 9
						£8,024 15

Appropriation of Balance.

Dividend on share capital, at 6 per cent. per annum, less income-tax					£1,164	9 8
Preliminary expenses, to be written off	£100	0 0				
Parliamentary expenses, ditto	100	0 0				
Land account, ditto	100	0 0				
			300	0 0		
			£1,464	9 8		
Balance to be carried to next account			74	13 1		
			£1,539	2 9		

The Chairman moved that the report and accounts be received, adopted, and entered upon the minutes. In doing so, he said, the history of this company, as you are probably aware, has been one of unvaried success. It is but a few years back that it commenced as the lessee of the Sydenham Gas and Coke Company with an income less than £2000 a year; whereas, to-day, we meet and find that the profits of the half-year almost amount to the total rental at the time we commenced. Since that period, the works have been increasing, in order to accommodate themselves to the enormous increase which has taken place in this district. To meet the requirements of the Crystal Palace, this company was first originated, and subsequently to meeting the requirements of that magnificent building, we had to supply the vast population around it. We have roads, streets, and houses now calling for a supply of gas that were never thought of at the origin of the society; so that we have now a gas rental of very nearly £12,000 a year. At our commencement, we were simply lessees of buildings and land; but our buildings are now occupying freehold land, and we have been enabled to lay out our works upon a plan which is calculated to be in the highest degree advantageous to our future supply to the district, however large that may be. As the buildings increase and extend, we also shall find the capability of increase and extension, so as to meet any requirements which we may be called upon to fulfil. Something of this kind is anticipated in the 3rd paragraph of the report, where we point to the necessity of increasing our means, with a view to the extension of the mains, and also for the purpose of increasing the amount of our storage for gas. We feel that, in another year, we may be called upon to find more space in order to accommodate the consumption of gas which the district will need, and it is thought desirable that the £8 per share still owing on the £2 paid shares, should be paid up voluntarily by those of the shareholders who are desirous of doing so. The appeal which we made on a previous occasion was responded to in so energetic a manner, that we have no doubt this will be responded to with equal vigour. I think it is scarcely necessary that I should make any remarks with regard to the position of the company. It is one of success; and I think, with the determination to do well, we shall succeed in making this company as successful as any other in the metropolis.

Mr. James Curtis seconded the motion.

The Chairman, in reply to a question by Mr. Livesey said, the directors had in view simply the completion of the buildings which were already erected, and that amount would be moderate indeed; since the report had been in print, however, the importance of having more gasholders had forced itself upon the directors.

Mr. Stevenson believed that they contemplated taking £6000, if the shareholders would pay up that amount.

Mr. Livesey reminded Mr. Stevenson that the company had not yet exercised the borrowing powers given at the last half-year's meeting. He would like to know why that was not done. It was stated, at a former meeting, that they could get money at 4 or probably 3 per cent., and now they were going to take this at 6. He saw by the accounts that they expended something like £6000 last year; and, if he was rightly informed, they had storage rate of 70 per cent. That was equal to any gas company in London. If that was the case, there could not be any necessity for increasing it. In reference to the accounts, he remarked that there was a great falling-off in products which were 2½ per cent. in the year 1858, and only 2 per cent. in the year 1859. The bad debts he saw had increased from 35/100ths to 75/100ths or from about one-third to three-quarters. Then, the sulphate account appeared to be a most extraordinary item. It made £17 10s. The lime alone, if he was right, ought to have fetched £50; and, although the price of sulphate had fallen considerably, still it would answer the purpose of manufacture. He would next like to know the meaning of the word "sundries," for, unless the sundries formed a large portion of that item, the charge for lime and oxide was too heavy for purifying. In the previous

half year's account, there was the small item of £7. for new services and repairs, while there was none in this half year; consequently, if the accounts were kept in the same way in this respect, they could not have done any business at all.

Mr. STEVENSON said the questions which Mr. Livesey had addressed to the meeting arose out of the alterations in the form in which they kept their accounts. In the way in which they had kept them prior to this half year, they felt there was, to a certain extent, an inconvenience. Their accounts did not assimilate in form to those of the other companies in London. They, therefore, looked into that question, and endeavoured to draw out an account which should contain those items which were generally contained in the balance-sheets of gas companies. As regarded the outlay—when the report was written, they contemplated on outlay of about £3000, which they thought would meet their requirements for mains in the district; but, as the chairman had said, they decided, since then, that it was absolutely necessary to make a new gasholder; and, in making a new one, they contemplated one of a large size. Mr. Livesey had gone somewhat into detail in that matter, and had arrived at the conclusion that they had gasholder-room for 70 per cent. of their supply. He (Mr. Stevenson) was not of that opinion. Their gasholding-room amounted to 190,000 feet, and their largest supply last year was 284,000. Looking to the increased supply which they might anticipate next winter, the present gasholding room was insufficient. That was the opinion of the board, and with that opinion he most cordially agreed, and he thought it would not be prudent in a company like this to go through next winter with only the present room. He thought that, upon those figures, Mr. Livesey himself would be inclined to alter his opinion.

Knowing that they had increased their rental within the last year nearly £2000, they must not go into the next winter calculating upon the consumption of this. The falling-off in products had arisen from the sale not having been so good as it ought to have been. He found that the products in 1858 were about 8s. per ton of coals; on the first half of this year, they were 7s. 1d. and on the second half of the year 7s. 0¾d., so that there had been a loss of nearly a shilling. That arose from the ammoniacal process—he did not know the reason why, but he believed it had arisen from that. In the new works, they had no purpose for sulphate of ammonia; and, as they had towards the end of the year entirely abandoned the whole works, and the retorts there had not been used, that accounted, to a certain extent, for the falling-off of the products. Mr. Livesey had remarked upon the items, sundries, and the cost for services. The item "lime, oxide, and sundries" was given in their former balance-sheets, but they thought it best to include in one item the lime and oxide alone for the purification, and they had taken the small sundries, which were put formerly under that head, into trade charges. All the sundries, in fact, which had been included before either in the report or in the lime account were now included in "trade charges." The charge for lime and oxide was for purifying, and included the stock in hand.

Mr. STEVENSON, in answer to Mr. Box, said: The capacity of the gasholder which they contemplated erecting would be 230,000 feet. It would be 110 feet in diameter, and 25 feet deep.

Mr. BOX said he belonged to six gas companies, and this was the only one in which the income-tax was not paid by the directors. He should, therefore, move that the dividends be paid clear of income-tax. They had a balance in hand of £94; and, as the income-tax would only require £32, there was quite sufficient in hand. He did not say that the balance was immoderately large—it was hardly large enough; but, if they wanted to make this a model gas company, he thought the first move towards that would be to pay the dividends clear of income-tax. Another step they might take in that direction would be to lessen the expenses. In reference to the additional gasholder, he knew from experience, that companies had suffered largely for want of gasholding room, and also for want of mains of sufficient capacity. He hoped they were not getting into that habit of laying down mains of bare capacity for the present time. If they were looking forward to a very large increase of business, they could not do better, and it was a very provident outlay to put down mains double the size of those required at the present moment.

Mr. STEVENSON observed that it would cause them a little inconvenience this half-year to pay the income-tax; but, if the proprietors would allow it to rest as it was, the directors would make a point of paying the dividends clear of income-tax in future.

Mr. BOX, on that explanation, withdrew his resolution.

The CHAIRMAN said the directors were doing on every occasion what Mr. Box suggested, making plenty of gasholder room and large mains,—in fact, the possession of large mains was a matter of paramount importance in the distribution of gas by all gas companies, because they knew that, when the mains were large, the friction was less, and the escape by pressure less likely to take place. It was a point of economy in reality. Their per centage of leakage was only 19 per cent.

Mr. BOX considered that to be a great deal too much in a company of that kind; it was more than as much again as it ought to be. He could tell them of a gas company in which it was not 5 per cent.

Mr. LIVESEY said he did not believe it would ever be lower. The company lost as little as possible by leakage.

The adoption of the report was then agreed to.

Mr. BOX inquired the amount the company intended to expend in the extension of their works?

Mr. STEVENSON replied £65,000. It was not yet quite settled.

Mr. George Sylvester, Mr. Pocock, and Mr. Hetley, the retiring directors; and Mr. Fasson, the retiring auditor, were severally re-elected.

Mr. G. HYDE moved, and the Reverend GEORGE POCOCK seconded, a vote of thanks to the directors for their exertions during the past year, which was likewise carried.

The CHAIRMAN said he knew that those who had the direction of their affairs gave a great deal of care and attention to them. He knew that it had been a subject of constant anxiety to his friend, Mr. Stevenson, to propose a balance-sheet like that produced before the present meeting. He had the advantage of having the proprietors to criticize the accounts; the criticisms of Mr. Livesey and Mr. Box, were of great use to the directors; but, in addition to the form of the accounts, the figures necessarily required great care. This company was blessed with two auditors, to whom he begged to propose that the meeting should return thanks, for the careful and able manner in which they performed their duty. Mr. Fasson and Mr. Pashley were both of them very zealous in going carefully into the figures, and he was quite sure that there was not a single account which had not been carefully analyzed by them.

Mr. BOX seconded the motion, which was unanimously adopted.

Mr. CURTIS proposed a vote of thanks to Mr. Ohren, the engineer and secretary of the company, which was seconded by Mr. FASSON, and adopted.

A vote of thanks to the Chairman having been adopted,

The CHAIRMAN, in reply, said his heart was certainly bound up in the interests of that company. He was amongst those who first saw the egg laid, out of which the future chicken was developed. He had watched its progress carefully from the very beginning to the present time; and, if there were any difficultics, if there were any faults, if there were any errors, they were just those that could not be prevented. He did not deserve their thanks, because he was only doing his duty to them and to himself as a shareholder. It was the duty of us all to have a brotherly feeling for our fellow men, even to them that were strangers. Men who were associated in a common work like this company, could not be regarded as strangers. They were brethren; their object was to *illuminate* all mankind by the agency of gas. If there was a question asked, and to which a solution might be given, he should feel it his duty on all occasions, even though the answer should go against himself, to give it as truly as he would expect to be answered by his own son. However, he thanked the meeting most heartily and sincerely for the particularly kind manner in which upon that, as upon all occasions, they had supported him while he had occupied that chair.

INQUEST ON THE FIRE IN WOOD STREET, CHEAPSIDE, LONDON.

On Friday, March 16th, an inquest was held in the Court of Common Pleas, Guildhall, before William Payne, Esq., Coroner, and a jury of fifteen citizens, to inquire into the origin of a fire which occurred at the premises of Messrs. Morley, 121, Wood Street, on the morning of Monday, the 27th February.

Mr. ROBINSON attended to watch the proceedings on the part of Messrs. Morley. Mr. W. D. KEENE appeared for the Great Central Gas Company, and Mr. MORGAN, of the firm of Humphreys, Son, and Morgan, for the Sun Fire Company, in whose office the premises were insured.

Mr. ROBINSON said there were many facts not in dispute in this case, which perhaps it would be well to state at once to the Jury. It appeared that the Chartered Gas Company had for a considerable period supplied Messrs. Morley with gas, but that these gentlemen had become desirous of changing to the Great Central Company, the manager of which company called upon them and promised to arrange the whole matter, and to send people on a certain day to make the desired alterations. On the morning of the 27th ultimo, the workmen of the Great Gentral Company accordingly went to Wood Street, and took up the pavement in the front of the house for the purpose of laying on the new service-pipe. The opening in the pavement was made immediately over the spot where the Chartered Company's service was laid, and the workmen opened a channel directly along the line of that pipe to the basement of Messrs. Morley's premises, where at the time the gas of the Chartered Company was burning. They then made a hole in the main of the Great Central Company, which lay under the footpath, and between the Chartered main and the house, for the purpose of inserting the new service-pipe. The consequence, however, was, that the gas in the main rushed out at the opening, along the channel in the footpath into the premises of Messrs. Morley's, through the hole made for the passage of the service-pipe, and was ignited by the burners in the basement story, causing an explosion, and the destruction of the premises by fire. The ordinary course, as he was told, when an aperture in a main was made to admit a service-pipe, was to stop the passage of the gas at both sides by inserting a bladder, and partially inflating it with air, by which all danger and risk from explosion were entirely prevented.

Mr. KEENE said he desired it to be understood that he did not assent to one single word in the statement just made.

The following evidence was then taken.

John Locke, examined by the CORONER.

I am a porter in the service of Mr. John Lee Morley, and was at his premises in Wood Street on the day of the fire, which occurred between half-past ten and eleven o'clock of the morning of the 27th February. I was in the basement story at the time of the explosion. There was a slight smell as from an escape of gas about five minutes beforehand, and then there was a great volume and body of gas rushed in. I did not see where it came from, and cannot tell the cause of the explosion. We had three burners alight in the basement at the time. I immediately made my escape at the front door. When I got into the street, I saw a great body of gas rushing into the warehouse, which appeared to come from the flag-stones close to the windows nearest to Cripplegate. The house was burnt down.

By Mr. ROBINSON: Two men came that morning, about half-past eight. At that time I was at work in the cellar, and we had three burners alight as usual. Those lights were supplied from the Chartered Company. One of the men came to me, and asked if I wanted the lights burning? I said, yes, we work by them, and they are alight all day long. He then looked at the meter, and went up-stairs.

By the CORONER: I do not know in whose employ the man is.

Mr. ROBINSON: As a matter of fact, the Great Central Company.

Examination continued: I heard the men at work afterwards on the pavement while I was in the basement. There were windows in front, and two or three little doors, through which to slide goods down. The windows were open. The men at work outside could not see the lights in the basement. The nearest window to the place where they were working was about two or three feet. I had no idea they were working in any dangerous way, or I should not have been there myself. The gas came in through a hole, which, I suppose, the men made; it was not there before. The explosion tore up the roof of the basement and the floor of the warehouse.

By Mr. MORGAN: I cannot tell whether the men had interfered with the pipes of the Chartered Company when the explosion took place. I could not tell what they did outside. The meter of the Chartered Company was in its proper place at the time, and the lights were burning the same as usual. John Bicknell was the man who came down into the basement to look at the meter. He did not remain five minutes, and I did not see him after that at all. I saw there was a hole in the wall; I do not know who made it. I cannot tell the distance from the main pipe under the pavement to the hole. The main is in about the centre of the pavement.

By Mr. KEENE: The smell of gas was very strong about five minutes before the explosion. I do not know anything about other burners being alight in the house besides the three mentioned.

Daniel Binfield, examined by Mr. ROBINSON.

I am a porter in the service of Messrs. Morley. I went to work at eight o'clock that morning. When I went down into the basement afterwards, I saw that the gas was alight. That was about half-past eight, and there was no smell of gas then. I saw Bicknell and Allen outside; they were using a pick, and I heard a noise. I asked them what they were going to do? and they said they were going to put on a new service. I said I had heard nothing about it, and asked if they were right. They said the foreman had orders about it on the Saturday. We were engaged carrying goods upstairs until a quarter past ten, and after that I was engaged in the front warehouse until the explosion took place. I know that the men continued their work, because I could see the flags lying against the house, and I could hear their picks. The explosion came from the cellar, and blew up the roof of the basement and the floor of the warehouse. I was lifted by it on to a part of

the floor that was sound, and I got on the packing-table and so out of the front door. By the time I had looked to see what was the matter, the place was in flames below, and I saw a body of flame rushing from the front where I had seen the paving-stone taken up.

By Mr. MORGAN: I did not see the exposed pipes at all, nor have I seen them since. I saw a flame from the pavement rushing through the hole made in the floor; the hole was not large enough for me to see it going through the wall. The flame came from the outside, because after I got out I saw it burning there, about a foot and a half from the hole. I did not see any pipes outside.

By Mr. KEENE: There was one principal explosion, and, after that, four minor ones. They were all at the same spot, in the basement, and no where else. The interval between the first and second explosion was not more than half a minute; it might be less; the interval between the second and third was not more than a second, and the third and fourth the same. The four last were all within a second of each other. I saw the hole in the wall, when I came out, where the flame was burning; it was going through the hole as well as through the window. The hole was on the left hand of the lower window towards Cripplegate.

John Bicknell, examined by Mr. ROBINSON.

I am in the service of the Great Central Company, and was directed to lay on the gas from their main to the house in Wood Street. Allen went with me on the morning of February 27th for that purpose. We got there a little after 8 o'clock; and the first thing I did was to go down into the basement and look at the Chartered Company's meter, in order to see where the service was to come in. The gas was alight at that time. I saw the last witness down there, and told him that I wished to have the lights out. He said, "We cannot put them out, for we work here the whole of the day." I said, I should like them out, and he said, "we cannot put them out." In our business we always like a light away, if we possibly can, and I thought it would be more safe without. I then went above, and began to pick the pavement. Our main runs along under the foot path, and I made a channel two or three feet, completely up to the house. The pipe was about three feet from the wall of the house, as near as possible. There was a hole into the basement, where the service-pipe went through, and we might have made that hole slightly larger. The front part we did make larger, but not right through. The hole was about a foot from the surface of the street. The service-pipe from the Chartered Company's main, passed underneath our main 9 or 10 inches, and rose to the hole in the wall. We were going to carry our service-pipe over that, and the enlargement of the hole took place above it. We took out a couple of bricks from the front part, but merely shoved a chisel through into the basement. The bricks taken out did not constitute the thickness of the wall. It appeared to me to be a pillar there. The enlargement was about 6 inches, the depth of two bricks, and continued through to about 2 inches, and would, therefore, be in the cellar about 2 inches round. We made a hole in the main of the Great Central Company. We were going to put in an inch-and-a-half service, and I burst it in about an inch-and-a-quarter, intending to pare it round to the size. I was in the act of paring it when the explosion took place, and had been, perhaps, a minute in doing it. The hole made in the main was opposite the hole in the wall. We stripped down on to the pipe of the Chartered Company, in order to carry over it; Allen was with me, looking on at the time, and had been so ever since I began to cut the hole, which was a little after 10 o'clock. From the time I burst in the hole to the explosion, it was about five minutes. I burst it in with a hammer and a half round. The gas came out pretty fast when I had done so. It would take me five minutes or a little over to pare it round, and make it ready for the service-pipe. It depends upon the nature of the main. This one was very brittle, and we were forced to be careful with it. I had the service-pipe outside in the truck.

By Mr. MORGAN: I did not try the service-pipe after I had burst in the hole to see whether it would fit. The hole would not have been large enough. We always take precaution in bursting in a main to prevent an escape of gas. If there is a hole, we stop it up with dirt or yarn, which I did on this occasion; I did it effectually to the best of my belief. I cannot say what became of the gas which escaped from our main. I stuffed the yarn into the hole which I had enlarged, as far as I could. The gas was blowing from the hole in the main all the time—about four or five minutes. The two holes were as near as possible opposite each other. I stopped up the hole in the wall before I began at all to touch the main—it might be at half-past nine, or a little after. We always dread fire where there is an escape of gas, and I thought, from the precaution I took, it was quite safe. I have not the piece of pipe here which I was using, it is at the works. The service-pipe of the Chartered Company was an iron one, and the communication between their meter and the pipe was by a brass joint on an elbow turned down, some distance below where I put my chisel through the hole, but the fittings were lead. The nearest light inside, to the hole where I was working, was 15 or 20 feet. I only saw two pendants alight; I went down to look at the Chartered meter, to see what room there was for our service.

By Mr. KEENE: That was about half-past eight. I then went away, leaving Allen at work, to get out the materials for the job; I made the channel from the main to the wall, and also the hole in the wall after I came back. I enlarged the hole from the outside. The tool I used was about two feet six inches long. The taking out of the two bricks was to allow for the play of the tool outside. The channel which I made was about a foot, or a little lower, than the surface of the pavement, and about two feet wide. Before I made the hole in the main, I stopped up the hole in the wall with some yarn which I took from the truck, and I rammed it in with the tapping-bar that I was going to use. That was after I came out of the cellar, when I went to ask them to put out the lights. I pared the main all round as thin as I could, where I was about to make the hole, before I burst it in; when I burst it in the gas escaped. I heard two explosions, the first being the loudest. They did not both appear to me to come from the same place; the first one seemed at a distance off, the last was close to me, and was a great deal weaker. The interval between them was a second I should say; I had just time to cock my head up. It blew me out of the hole into the middle of the street, and I got my left arm very badly burnt. The fire did not come from our main until it came from the premises. I put my cap over it, and my mate dabbed it up with soil. I was in the hole when the fire communicated; my back was towards the street. As soon as I turned round, after being knocked down by the force of the explosion, I saw the flame in the channel.

By the CORONER: I really think it impossible from the precaution I took that the gas could go through the hole in the cellar from our main; I cannot say how the fire originated. We do not take means to stop the gas off on both sides before bursting in a hole in small mains of that description. It tends to weaken them so much, as we have to cut three holes for this purpose. There are no stop-cocks at intervals in the main. It would not do, as it would shut other consumers off; the gas is on all day. There are no means whereby we can prevent an escape of gas after we have burst in the hole.

John Allen, fellow workman of the last witness, gave similar evidence.

Mr. *Joseph Sorrell* examined by Mr. MORGAN.

I am clerk to Mr. Freeman architect and surveyor. I have made a survey of the premises, 122, Wood Street, shewing the gas arrangements and produce, plans, and sections. It was made since the fire. The distance from the Great Central Company's main to the front wall of the house is 3 feet 1 inch. The main itself is 3 inches and $\frac{5}{8}$ths in diameter. The thickness of the wall is not marked on this plan, but it scales 2 feet 6 inches. The hole through it is 14 inches by 8, *i. e.* 14 inches from the top to the bottom, and eight inches wide. When I saw it after the fire, there was some rubbish in it, but the measurement was the same as I have mentioned all the way through. The pipe was not there at the time; it was found and produced afterwards. On the right of the hole as you stand in the street, there was an open grating. The distance between the two is 10 inches. The fire has not in any way affected the hole through the brickwork; it scarcely injured the bricks, and I should say, it is decidedly the same in its magnitude that it was before.

By Mr. KEENE: I did not know the premises before the fire.

By the CORONER: I cannot tell what part of the hole the service-pipe of the Chartered Company went through.

Mr. ROBINSON said he should like to call Mr. Morley to show that the manager of the Great Central Company took the whole of the arrangements.

Mr. *James Morley*, examined by Mr. ROBINSON.

I am the father of Mr. Morley, the owner of the premises. The Great Central Company wished to have the supply, and as I knew their collector very well, my son did it entirely on my account. We had been supplied by the Chartered Company for a long time, and there was no complaint whatever about them. The exchange was purely at the solicitation of the Great Central Company. Mr. Chesman, the collector, has frequently spoken to me about it, and I introduced him to my son. He said the company would take care to carry everything out, and that we should have nothing to do with it. He did not say anything about communicating with the Chartered Company. He went and counted the lights while I was there, and a day or two afterwards the superintendent, as I understand, came from the company to do the same. I said, Mr. Chesman has been here before, and he said, "we will take care to carry the arrangements out, and you will have nothing more to do with it."

Mr. *Alfred Upward* examined by Mr. ROBINSON.

I am the manager of the Brick Lane station of the Chartered Gas Company. On the morning of the explosion, I called to see Mr. Morley, and ascertain the reason for his leaving our company. As I was going down Wood Street, I saw a Great Central Company's truck standing opposite the door, and the men at work in front. I crossed over to ask them what they were doing, and they said they were going to lay on a service from their main. I saw that they had an inch and a half hole cut in a 3-inch main, which was only three feet away from the wall, and a channel cut from the main to the house. There was evidently some fresh brickwork cut away, but I did not notice the size of the hole in the wall. I should not have cut a hole in a main without stopping the communication for the gas on both sides; as the main was a small one, I should have used a bladder on both sides, and so had the spaces between without any gas in whatever. If that had been done, there could have been no accumulation of gas in the premises. When I went into the house I saw one of the clerks, and was directed up stairs to find Mr. Morley, but I had not gone up six steps, before the explosion took place. I immediately attempted to make my escape, but found I was cut off by the flames. The explosion must have come from the basement. The partitions were blown down between the ground and first-floor, and the ceilings were dropping in from the effects of it. I was not burnt at all. I ran up stairs, and as I went, I called to the young men on the various floors, to make their escape by the roof. The chances are that several lives would have been lost if I had not, for the fire was through the roof before I got up. We escaped by means of a ladder, through a hole in the skylight. At the time I went to the premises, I saw the hole through which the men were going to place their service; I have not seen it since. I have no doubt, that the effect of making it was that, when the gas escaped from the main, it accumulated in the basement. After making my escape over the roof, I went to see what was the state of our meter, as I was anxious to shut it off as soon as possible. I then saw the flame issuing into the house from the Great Central's main, through the hole I had seen the men making previous to going into the house. The gas accumulating in the basement would cause the explosion; the explosion would commence where it fired, and the flame would then rush out and catch the gas issuing from the main. I think there are two reasons why the gas would accumulate in the basement—one is, the force with which we are compelled to drive the gas through our mains, and the second, is the fact of the air in the house being more rarefied than the external atmosphere, which would naturally draw the gas along the channel like a chimney, towards that point. The gas being alight in the basement, would have the effect of rarefying the air. That is the only way in which I can account for it. I saw the gas from the Central Company's main issuing from this little area or window, which was close to it. The gas issuing from the hole, which the men had made in the main, was on fire, and blowing into Messrs. Morley's premises, and I helped to put it out. The area grates were open when I entered the house.

By Mr. MORGAN: I did not see any yarn in the hole in the wall. I think I should have seen it, if there had been any. I do not think it was thirty seconds from the time I saw the hole until the time of the explosion.

By Mr. KEENE: I should not have thought of cutting an inch-and-a-half hole in a 3-inch main, without bladdering it off on both sides. I have frequently undertaken an operation of this sort, and I should have directed our inspectors to do so. I cannot give name, spot, or time, but merely say I have done it and given instructions to have it done. I was not a quarter of a minute with the men, before I went into the house, but I had time enough then and afterwards to see the hole in the main. I also saw there was a hole in the wall to admit the service. I most distinctly say, that there was no yarn in that hole. The depth of the hole is about 15 inches. I represent the company which was to be displaced on that occasion, and I went to the house to endeavour to get the customer back again. I was told yesterday morning to attend this inquiry; but I was spoken to on the subject some time before. I said that there were two causes for the explosion, the first, the escape of gas, under pressure from a main so near the house, a hole being made in the wall, which would naturally force it inward; and secondly, that the air in the house being more rarefied would cause a suction; that is my belief. The gas in the main would be a little warmer than the air in the street, but only a little, because the main is so near the surface.

By the CORONER: I should say the hole in the Central Company's main was nearly opposite the hole in the wall, because when I went to the spot afterwards I saw their gas was on fire and blowing into the house. I do not think it would have weakened the main to have had a bladder on both sides. A very small bladder is required for a 3-inch main; and a $\frac{3}{4}$ hole would have been quite sufficient to insert it through, and it would have been bladdered off at some little distance.

Mr. *Sorrell*, in answer to Mr. ROBINSON, said: The hole in the wall appeared to be just below the surface of the floor; he could not tell how far the burners were from it.

Serjeant Mitchell (City Police 41) and *Frederic Banham*, police-constable 431, deposed to being called to the fire, and seeing the gas ignited as it issued from the Central Company's main.

William Swanton, examined by the CORONER.

I am a fireman. When I arrived in Wood Street on the morning of the explosion, the fire was well through the building. I cannot tell how it began. I saw a gas-pipe just under where the pavement had been, delivering gas into the house as fast as it could. I should say it was a 1½-in. pipe.

By Mr. ROBINSON: I saw the main, which was about a couple of feet from the wall; I saw no gas issuing from that. All I saw was the inch-and-a-half pipe just where the floor had been. There was no meter attached.

Mr. *Swain*, examined by the CORONER.

I am in the employ of Mr. Morley, and was in the basement shortly before the explosion took place. The man (Bicknell) was there with a chisel, or small crowbar, enlarging the hole through which the chartered gas pipe passed. The meter was close to it. I asked him what he was doing; and he said putting on a larger service. At the time of the explosion, I was in my department on the ground-floor, about half way down the premises towards the back. The fire was between me and the street. The place was in flames immediately. The sound caused by the explosion was decidedly towards the street. I only heard one explosion, the effect of which was to blow up the ceiling of the basement and the floor of the warehouse. I saw the flames through the flooring. There was only one meter in the basement. The gas was alight whilst I was down there.

By Mr. MORGAN: When I saw Bicknell he was at work in the wall. It appeared to me that the hole was almost, if not quite through; and that he was clearing the rubbish and small pieces of brick from round it. This was about ten minutes before the explosion. The meter was about a foot below that hole.

John Bicknell was recalled, and, in answer to the Coroner, he said: I went into the cellar to see if the hole was straight, and I put my arm through it. I was forced to go inside to clear it out. As we were tied for room, I put the chisel in the hole from the inside to reach it out. I could not injure the service-pipe of the Chartered Company, by so doing in the least. It was an iron pipe, and I had no hammer.

Mr. *John Vinson*, examined by Mr. ROBINSON.

I am in the service of Mr. Morley. On the morning of the explosion, when I arrived at the premises, I saw the men at work taking up the paving-stones. A few minutes after 10, I spoke to them and told them there was a strong smell of gas. I noticed, afterwards, that the gas was alight down stairs. On returning to the warehouse afterwards from Cheapside, I heard the explosion; saw part of the windows blown out, and the main on fire. The fire was burning from the hole in the Central Company's main, which I had before seen the men cutting. The flame was not sufficient to touch the house. The part blown out in the basement was very nearly over the meter.

Mr. *R. Atkinson*, examined by Mr. ROBINSON.

I am in the service of Messrs. Edgecombe and Company, next door to Messrs. Morley's premises. On the morning of the explosion, I was in the basement-story of our own house, when the gas going out attracted my attention. That was before the explosion took place. We are supplied by the Great Central Gas Company. There was no cause for our lights going out that I knew of at the time. The smell of gas was very strong in our place; it came from the front. The explosion took place about five minutes afterwards; it appeared to come from Wood Street, and not from the back of the premises. I did not hear more than one, which was a very heavy explosion. I know of no reason for our lights going out, except from the great waste from the hole which was cut.

Mr. *James Braidwood*, examined by Mr. ROBINSON.

I am superintendent of the Fire Brigade. I got to the fire in Wood Street, about 10 or 12 minutes after the explosion took place. I found the whole house on fire from bottom to top. There was a pipe reaching nearly within the building, but not quite, and the gas was coming out from that in large quantities. It was the Chartered Company's pipe. I saw the hole in the Central Company's main a day or two afterwards; I had the ground opened for the purpose. I did not see it on fire; it was stopped, I understand, almost immediately. There is no question that the fire originated at the bottom of the house; it could not have come down from the top so quickly. I have formed a distinct opinion as to the origin of the fire; but it is only an opinion. It appears to me that the men had opened a hole in the 3-inch main, and that the gas from that had been drawn into the house by some means or other, whether by the draught or not, I cannot say. When the explosion took place, the meter of the Chartered Company was blown away, or the lead pipe which connected it with the iron service was melted, and in either case the gas of the Chartered Company escaped, and was lighted up and continued to burn till some of their men took the pipe away. It was not stopped for an hour afterwards. The explosion was caused, in my opinion, by the accumulation of gas in the basement from the hole in the Central Company's main.

By Mr. KEENE: There is no question that, if the gas from any of the pipes in the basement had escaped for a sufficiently long time to cause the gas to reach the lighted burners, an explosion would have taken place, the lead would have melted from the meter, and the same result have followed. It is quite immaterial where it comes from, if it is allowed to accumulate; but, from all I have heard, I have no doubt whatever it came from the Central Company's main.

This being the whole of the evidence, the Coroner proceeded to sum up. The questions for the jury, he said, were these:—first, where did the escape of gas come from which caused the explosion? and, secondly, by whose agency was it done? After commenting upon the facts deposed to by the various witnesses, he said it seemed to him difficult to account for an accumulation of gas in the basement of the premises from the Central Company's main, if the hole in the wall had been properly plugged up. He had at first been inclined to think that, in enlarging that hole, the workman had injured the service-pipe of the Chartered Company, and so caused the accumulation of gas; but, after hearing that the lights in the adjoining house, which were supplied from the Central's main, had gone out, it was evident there was an escape of gas from the latter before the explosion took place. It was said by one of the witnesses that this escape could not be prevented when the service was to be laid on without weakening the main pipe, or stopping the supply of gas to other houses.

Mr. ROBINSON said he believed that would really not be the case.

Mr. *Upward* was recalled, and stated that it would not affect the supply to other houses, because the gas would be stopped close into the place where the pipe was to be cut away.

The CORONER inquired how the gas was to get from one part to another beyond the stoppage?

Mr. *Upward* said it would be by means of riders. The Great Central's large main was in the middle of the street, and they had a small one at each side, close to the buildings, and there might be half-a-dozen communications in the street between the large and small mains.

Mr. *John Johnson* was called: He said he was the chief inspector of the Chartered Gas Company, and knew the position of the Central Company's mains. They had a 3-inch main on the same side as Messrs. Morley's premises, and a 10-inch main on the opposite side of the way; between which there were several communications at various intervals. If he were about to lay a pipe, he should take care not to bladder off any services. The mains of the Central Company were so connected, that they were fully charged both ways, so that, if there was only one communication in the street between the large and small mains, it would not stop the circulation of gas to other houses to bladder off a portion while laying on a service.

The CORONER proceeded with his summing up, and said, if the jury were of opinion that the explosion was caused by an escape from the Great Central main, they would have to consider whether that company had done all they could to prevent mischief; which ever way it was caused, it was no doubt the result of accident, though arising, perhaps, from negligence, as the men certainly did not intend to set the place on fire.

The Jury consulted for a few minutes, and then inquired whether the window leading down to the basement was open at the time of the explosion?

John Locke was recalled, and stated that it was open.

After some further consultation, the foreman of the jury said:—We are all agreed that the fire was caused from an explosion of gas, caused by a want of caution on the part of the Great Central Company's servants.

The inquiry then terminated.

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Average Weight of Cast-Iron Gas-Pipes, per Yard.

1¼ in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lbs.

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	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig Iron, No. 1	4 0 0	2 17 6	3 0 0	3 5 0	3 10 0
1¼ and 2 inches Socket-Pipes	7 0 0	6 0 0	6 5 0	6 10 0	6 15 0
2½ and 3 ,, ,,	6 10 0	5 10 0	5 15 0	6 0 0	6 5 0
4 and 5 ,, ,,	6 0 0	5 0 0	5 5 0	5 10 0	5 15 0
6 in. and upwards ,,	5 15 0	4 15 0	5 0 0	5 5 0	5 10 0
Retorts, 1st fusion, hot blast	5 10 0	4 10 0	4 15 0	5 0 0	5 5 0
,, 2nd ,, cold ,,	6 10 0	5 5 0	5 10 0	6 0 0	6 5 0
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WROUGHT-IRON TUBING,

Subject to 40 per cent. Discount.

	2 in.	1½ in.	1¼ in.	1 in.	¾ in.	½ in.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Patent Welded Tubes, from 2 to 12 ft., perft.	1 8	1 0	0 10	0 7	0 5	0 4½
,, ,, ,, 6 in. to 18 in., each	3 0	2 0	1 9	1 3	1 0	0 9
Connecting-Pieces, or Long Screws	3 6	2 3	2 0	1 6	1 2	0 11
Bends, Springs, and Elbows—wrought iron	3 9	2 3	1 9	1 0	0 10	0 8
Tees, wrought or cast	4 0	2 6	2 0	1 6	1 1	0 10
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Iron Cocks	17 6	9 6	7 6	4 6	3 3	2 6
,, with brass plug	28 0	16 0	13 0	7 0	5 6	4 6
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Pelton	7 9	Lesmahago, at Glasgow	25 0
Ramsay's Newcastle Cannel	16 0	,, ,, Leith	27 6
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Chatham & Rochester	6s. 6d.	Boulogne and Calais	£8 0 0
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Dublin	12 6	Cadiz	13 0 0
Exeter Quay	10 0	Copenhagen	8 10 0
Folkestone	8 0	Dieppe	9 0 0
London (Pool)	6 0	Genoa	23 0 0
Lowestoft & Yarmouth	5 0	Hamburg	8 2 6
Lynn	—	Havre	9 5 0
Portsmouth	7 0	Leghorn	23 0 0
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Best Newcastle Fire-bricks	per 1000	50s. 0d.	
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Personal attendance will not be required on that day, but a future day will be then intimated to such candidates as may be selected, when their attendance will be required.

By order, JOHN CLANCHY, secretary.
March 21, 1860.

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WM. P. BODDY, Secretary.
Offices, Rotherhithe, March 26, 1860.

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By order of the Board,
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Keyham, March 22, 1860.

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Particulars as to size, price, &c., will be forwarded on application to Mr. J. L. COCKER, Gas-Works, Merthyr Tydvil, GLAMORGANSHIRE.

COUNTY and GENERAL GAS CONSUMERS' COMPANY (LIMITED).

Notice is hereby given, that the DIVIDEND on the paid-up capital of this Company, for the half-year ending 31st December, 1859, at the rate of 5 per cent. per annum, will be PAYABLE on and after the 31st of March instant, between the hours of 12 and 2 daily, at the offices of the Company, 76, King William Street, E.C.

By order, R. S. PARKER, Secretary.
London, March 2, 1860.

CAUTION.

TO GAS-METER MANUFACTURERS AND OTHERS.

THE Undersigned hereby caution Meter Manufacturers and others against infringing the exclusive right of the Undersigned to the use of the Screw Adjustment for regulating the Height of the Overflow-Pipes in Wet Gas-Meters, as described in the Specification of the Letters Patent granted to Crosley and Goldsmith on the 19th of April, 1856; as well as against infringing any other portions of that or any other Patent of the said William Crosley; and

NOTICE is further given, that all Infringers of the said Inventions, or any portions of them, will be proceeded against. CROSLEY & CO.,
103, SOUTHWARK BRIDGE ROAD,
LONDON, Aug. 29, 1859.

Just Published, Price 1s.; by Post, 1s. 1d.,

A LETTER to the Secretary of STATE for the HOME DEPARTMENT on the SUPPLY of GAS in the METROPOLIS.
By THOMAS G. BARLOW, C.E.
W. B. KING, 11, Bolt Court, Fleet Street, LONDON.

ADDISON POTTER, WILLINGTON QUAY,
NEAR NEWCASTLE-UPON-TYNE,
Manufacturer of Clay Retorts, Fire Bricks, and every description of Fire Clay Goods.

GEORGE ANDERSON, Gas and CONSULTING ENGINEER,
104, LEADENHALL STREET, LONDON (E.C.).

DIRECT-ACTING GAS-EXHAUSTERS,
supplied either with or without Steam-Engines and Boilers.

FOUR-WAY DIAPHRAGM VALVES,
one of which answers the purpose of THREE ordinary Valves, as applied to Purifiers, or in shutting off and passing Station-Meters, Governors, or other apparatus, while the Connecting-Pipes are also much simplified.

RETORT SETTINGS,
designed to be heated by Tar alone, and with a total absence of Smoke.

Illustrated circulars, giving references and every information, may be obtained on application as above.

ALFRED PENNY, Engineer, WENLOCK IRON WORKS,
WHARF ROAD, CITY ROAD, LONDON.

Mr. PENNY begs to inform Gas and Water Companies that he undertakes the erection of new, or the alteration of existing, works; and that he may be consulted generally on all matters connected with gas and water supply. He is also prepared to supply best Coldblast Retorts, Socket-Pipes, and Connections, Iron Borings, &c. &c., and all the necessary Castings used in Gas and Water-Works.

*** Country orders executed with care and despatch.

CANNEL and COAL of the best de- scriptions for making GAS and COKE.
(As per Analyses.)

GAS CANNEL, 17s., 15s. 6d., and 14s. per ton.
GAS COAL, 11s. 6d., 9s. 6d., and 8s. 6d. per ton.
STEAM COAL, 10s., 9s. 6d., and 9s. per ton.
All free on board Vessels in Liverpool.

Handpicked Cannel and Coal about 10 per cent. additional. Concession in prices made for large quantities.

GAS APPARATUS of all descriptions, and on the most approved principles; also Purifying and other materials supplied.

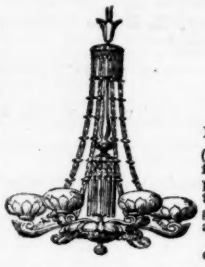
ANALYSES, PLANS, and ESTIMATES, and other information required, and the highest references furnished on application.

CONTRACTS for Materials and Works entered into.

No charge made for Superintending Shipments, Preparing Bills of Lading, or passing Entries.

EMANUEL TURNER and CO.,
EXPORT OFFICES:
34, CASTLE STREET, LIVERPOOL.

JAMES OAKES and CO.,
ALFRETON IRON WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 20, WHARF ROAD, CITY ROAD, LONDON,
Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including best cold-blast Iron Retorts, Socket and Flange Pipes of all sizes, Bends, Branches, Syphons, Lamp Columns of various patterns, &c.
N.B.—Orders for Cast-iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention.
CHARLES HORSLEY, Agent.
C. H. is prepared to carry out the warming and ventilation of public buildings, &c.; also civil engineering in general.



F. & C. OSLER,
45, OXFORD STREET, LONDON;
Manufactory—Broad Street, Birmingham—Established 1807,
MANUFACTURERS OF GLASS CHANDELIERS, GLASS LUSTRES, TABLE GLASS, &c. &c.
ELEGANT CRYSTAL GLASS CHANDELIERS, for GAS, from £4 upwards (Made from "REGISTERED" DESIGNS), with GLASS BRANCHES, &c.; suitable for DRAWING-ROOMS and BALL-ROOMS. The more extensive use of GAS in private dwellings has induced Messrs. OSLER to direct their particular attention to the manufacture of this class of articles—which, with a view to their general adoption, are offered at very moderate prices. Purchasers can select from a great variety of patterns, to which additions are being constantly made.
THEATRES, CONCERT, ASSEMBLY, AND BALL ROOMS LIGHTED BY ESTIMATE ON THE LOWEST TERMS.

FIRE-CLAY RETORTS.
JOHN SWARBRICK,
MANUFACTURER OF PATENT COMPOSITION CLAY RETORTS,
FIRE BRICKS OF EVERY DESCRIPTION, SHAPE, AND SIZE, &c. &c.
HIGHER EANAM, BLACKBURN, LANCASHIRE.
These RETORTS are generally used in the Gas-works of Preston, Accrington, Bury, Heywood, Middleton, Rochdale, Ratcliffe; the Mills of Messrs. Horrocks, Miller, and Co., Preston, &c. &c., and are unequalled in having afforded general satisfaction to those who have given these Retorts a trial.
To meet the increasing demand, the Works at Little Harwood have been greatly enlarged; and Gas Engineers who may favour with an Order may rely with confidence on their being promptly supplied with an article not to be surpassed in finish or durability.
PRICES MODERATE.

PADDON AND FORD,
GAS-METER AND APPARATUS WORKS,
GRAY'S INN ROAD, LONDON.
MANUFACTURERS OF WET AND DRY GAS-METERS, STATION-METERS, GOVERNORS, EXPERIMENTAL APPARATUS, &c. &c.
Sole Manufacturers of Sanders's Patent Compensator for maintaining a correct Water-Level in the Meter without impeding its legitimate action.
All Meters manufactured by P. and F. are guaranteed to be in strict conformity with Lord Redesdale's Sale of Gas Act.
A large number of **STATION-METERS,** up to 80,000 feet per hour (being by far the largest in use), and **GOVERNORS** for **MAINS,** up to 24 inches, have been constructed by Paddon and Ford. These Meters and Governors possess peculiar advantages as regards strength and freedom of action. The Meters are warranted to offer less resistance than Meters generally.
Manufacturers also of **PADDON'S PATENT STREET-LAMP REGULATORS,** for insuring any required consumption. These Regulators are in general and increasing use, and references can be given to Gas Companies who use them for every Lamp.
Contractors for the erection or alteration of Gas-Works, and every description of apparatus required in Gas-Works supplied.

EDWIN DIXON,
WOLVERHAMPTON PATENT WROUGHT-IRON TUBE WORKS,
Originally established in 1833,
Manufacturer of Gas and other Tubes, Fittings, and articles of every description belonging to Gas, Water, or Steam.
E. D. had the honour of receiving the
PRIZE MEDAL
awarded to this Manufacture by the COUNCIL of the GREAT ENGLISH EXHIBITION of 1851; and from the latter date has supplied many towns exclusively with GALVANIZED and other Tubes for Gas and Water, under GOVERNMENT ENGINEERS.
A City, containing 150,000 inhabitants,
has recently been entirely supplied with Tubes made at the above-named Works, and several others with populations nearly as great; in fact, the reputation now acquired induces this notice to the public.
Large Stocks generally on hand, averaging from one to three hundred thousand feet.
HYDRAULIC PRESS TUBES,
to resist 6000 lbs. and upwards to the square inch, extensively manufactured.
STOCK DIES and SCREWING TACKLE
of the best possible description.
Every Tube carefully tested with Hydraulic Pressure before leaving the Works.

WM. RICHARDSON and CO.,
SPRING GARDEN IRON-WORKS,
DUDLEY, near BIRMINGHAM,
Manufacturers of Gas Apparatus in all its branches.
A large assortment of New and Second-hand Gas Apparatus constantly for Sale.
Gas Apparatus Enlarged and Exchanged.

LEONI'S Patent Adamas Gas-BURNERS (secured by Her Majesty's Royal Letters Patent), are entirely free from liability to CORROSION, injury from Heat, or danger of Fracture, and are UNALTERABLE in the dimensions of their Apertures.
Uniformity in the consumption of Gas is obtained by the process of manufacture, which ensures that the Burners shall be of precisely similar pattern.
The Adamas Burners are confidently recommended to Gas-Fitters, Consumers, and Companies.
Sole Manufacturer and Patentee in Great Britain, S. LEONI, Adamas Works, St. Paul Street, New North Road, LONDON, N.

GAS PURIFYING BY REVIVIFIABLE OXIDE OF MANGANESE.
MR. LAMING (Inventor of the Revivified Oxide of Iron Purification) begs to inform Gas Engineers that they may now supersede the material in general use by A REVIVIFIABLE OXIDE OF MANGANESE of his preparing, which in efficacy is at least equal, and in economy superior, to Oxide of Iron. Owing to the greater chemical activity of Manganese, common dry-lime purifiers of ordinary capacity will often be amply sufficient for it, though they may be too small for the Oxide of Iron material.
For Gas-Works possessing steam power, more especially such as are exposed to public complaint, Mr. Laming recommends the purification to be done either wholly or in part (depending on extent of apparatus) in out-of-doors scrubbers, hermetically sealed, by means of his liquid process, which is both economical, and meets all practical requirements.
118, Fenchurch Street, Aug. 1, 1859.

JAMES MEACOCK,
PATENT DRY AND WET GAS-METER MANUFACTURER,
7, SNOW HILL, AND 16, WEST STREET, LONDON.
ESTABLISHED 1836.

J. M. invites attention to his Improvements in **EXPERIMENTAL WET GAS-METERS,** by which he renders impossible any Leakage from the Stuffing-Box.
These METERS are GUARANTEED to meet all the REQUIREMENTS of the SALE OF GAS ACT.
GOVERNORS, STATION-METERS. PHOTOMETERS,
EXPERIMENTAL TESTING GASHOLDERS, HIGH-PRESSURE GAUGES,
AND ALL APPARATUS IN USE AT THE GAS MANUFACTORY.

CROSLEY & GOLDSMITH'S

PATENT SELF-ADJUSTING & COMPENSATING GAS-METERS

CANNOT BE OVER OR UNDERCHARGED WITH WATER,

and they consequently register the quantity of Gas consumed with greater accuracy than Meters in which the Water-Line is variable.

MANUFACTURED BY

CROSLEY & CO.,

GAS-METER MANUFACTURERS,

103, SOUTHWARK BRIDGE ROAD, LONDON.

N.B. The Patent Self-Adjusting and Compensating Apparatus may be applied to the ordinary Meter.

Manufacturers of LOWE'S PATENT MOTIVE-POWER METER, for situations where there is an inadequacy of pressure to supply the special requirements of certain consumers in low grounds during the day or night.

Also, Manufacturers of EXPERIMENT METERS, GASHOLDERS, GOVERNORS, MINUTE-CLOCKS, PHOTOMETERS, &c. &c., similar to those used by Mr. King, of Liverpool.

C. and Co. are the only house in the trade which has for years manufactured Meters according to the standard measure set forth in the 2nd Section of the "Sale of Gas Act," and which also comply with the rules laid down in the Section for testing meters. Purchasers of C. and Co.'s Meters may therefore be secured against any additional expenses being incurred in order to adapt their Meters to the requirements of the new Act.

WILLIAM PARKINSON AND CO.,

(SUCCESSORS TO THE LATE SAMUEL CROSLEY,)

COTTAGE LANE, CITY ROAD, LONDON, E.C.,

PATENTEES AND MANUFACTURERS OF

GAS-METERS, GOVERNORS, AND OTHER APPARATUS;

ALSO,

METERS FOR MEASURING WATER, &c., &c.

IMPROVED LOW-SPOUTED GAS-METERS,

Which completely meet the requirements of Lord Redesdale's Sale of Gas Act, and are as simple in their construction, satisfactory in working, and as low in price as the well-known Meters which have been made by W. P. and Co., and their predecessor, Mr. Samuel Crosley, during the last forty years, and of which there are about 300,000 now in use.

STATION-METERS AND GOVERNORS

Of all Sizes, of the best Construction, Materials, and Workmanship, supplied on he shortest notice.

There are about 300 Station-Meters at work of their manufacture, of sizes varying from 750 to 60,000 cubic feet per hour, of which the following are some of the principal ones, recently supplied by them to London Gas Companies, viz. :—

2	for	60,000	cubic feet per hour each	to the Chartered Gaslight and Coke Company, Westminster;
1	,,	40,000	,, ,,	Chartered Gaslight and Coke Company, Brick Lane;
2	,,	60,000	,, ,,	London Gaslight Company, Vauxhall;
1	,,	60,000	,, ,,	Commercial Gas Company, Stepney;
1	,,	40,000	,, ,,	Equitable Gas Company, Pimlico;
1	,,	40,000	,, ,,	Phœnix Gaslight Company, Greenwich,

&c. &c. &c.

And they have also supplied large Station-Meters to the Gas Companies at Birmingham, Nottingham, Sheffield, Southampton, Leeds, Newport, Glasgow, Manchester, Dublin, Cork, and all the principal towns in the United Kingdom, as well as many on the Continent, &c., &c.

Their Station Gas-Governors have been adopted by most of the above-named Companies, and have given universal satisfaction.

PRESSURE REGISTERS, EXPERIMENTAL METERS, PHOTOMETERS,

Minute Clocks, Consumers' Gas-Governors, Pressure-Gauges,

STANDARD EXPERIMENTAL GASHOLDERS FOR PROVING METERS, &c.

GEORGE LOWE'S PATENT NAPHTHA BOXES AND MOTIVE-POWER METERS,

WITH MACHINERY FOR WEIGHTS TO ASSIST THE SUPPLY OF GAS WHERE THE PRESSURE IS LOW.

SPECIFIC GRAVITY APPARATUS, RAIN GAUGES, &c.

BOULTON'S PATENT DRY GAS-METERS,

Of which upwards of 24,000 are at present in use, having gained for themselves an unparalleled patronage from all the principal Gas Companies and Consumers, on account of their unerring registration and the superior workmanship and materials used in their construction, enables the Patentee to sell them now at competitive prices with those of other makers.

Every description of Improved Wet or Patent Dry Meters and Gas Apparatus manufactured by

JOSEPH BOULTON,

28, BAGNIGGE WELLS ROAD, CLERKENWELL.

All Meters warranted to comply with the requirements of Lord Redesdale's "Sale of Gas Act.'

BENT AND SON,

283, BELL-BARN ROAD, BIRMINGHAM,

(ESTABLISHED 1830,)

Manufacturers of

J. C. BENT'S PATENT COMPENSATING GAS-METER;

Also of

ALLAN'S PATENT COMPENSATOR,

Both of which are warranted to meet the requirements of the SALE OF GAS ACT.

Station-Meters. Street Lamps of all kinds, plain and ornamental.

ESSON'S PATENT
COMPENSATING GAS-METER

Is guaranteed correct within the meaning of the "Sale of Gas Act." Manufactured only by WILLIAM COWAN, Buccleuch Street Works, EDINBURGH; and Strutt Street, MANCHESTER.—Established 1827.

FLOATS AND MECHANICAL VALVES ENTIRELY DISPENSED WITH.

KAY'S PATENT HYDRAULIC VALVE GAS-METER

Meets all the requirements of the Sale of Gas Act.

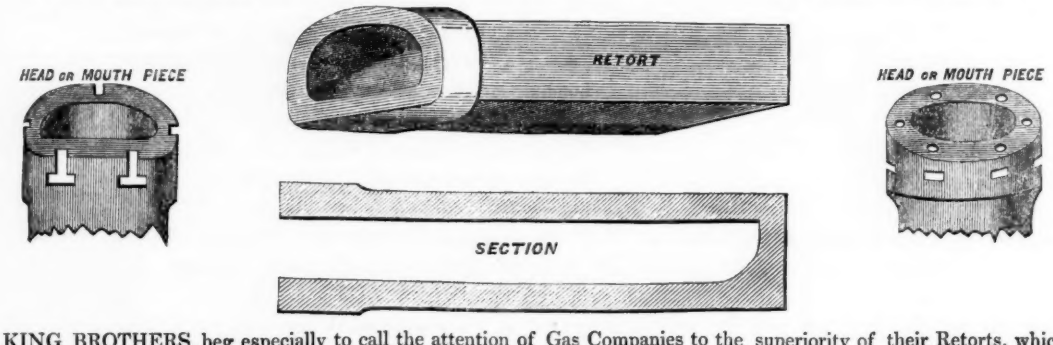
The only cheap means of bringing ordinary Meters within the limits of the Act is to affix to them the Hydraulic Valve, which can be done at a small cost, for which purpose Gas Companies can obtain a license from the Sole Manufacturer and Licensee,

WILLIAM COWAN,

Buccleuch Street Works, EDINBURGH; and Strutt Street, MANCHESTER.

KING BROTHERS,

STOURBRIDGE FIRE-BRICK AND RETORT WORKS,



KING BROTHERS beg especially to call the attention of Gas Companies to the superiority of their Retorts, which are made from the celebrated STOURBRIDGE FIRE-CLAY. Mr. King has patented a Kiln for Burning Retorts, by which Patent all Cold Air is excluded from the Kiln while burning, thus rendering them

FREE FROM CRACKS AND CORRECT IN FORM.

By great care in Manufacturing, combined with the advantages in burning, a VERY SMOOTH SURFACE is obtained, rendering them less liable to carbonize.

RETORT OVENS, FIRE-BRICKS, GUARDS, SADDLES, RABBITTED BURS, FLUES, AND QUARRIES, ARE ALL MANUFACTURED OF THE SAME QUALITY OF CLAY.

Every Retort and Brick is branded "King Brothers, Stourbridge."

FIRE-CLAY GAS RETORTS.

ESTABLISHED IN 1795.

JOSEPH CLIFF,

WORTLEY FIRE-BRICK WORKS, near LEEDS.

THESE RETORTS are unrivalled in excellence, being the BEST FINISHED INTERNALLY, and THE MOST CORRECT IN FORM, of any in the Kingdom. From the peculiar composition used in working up the face of the material, they are rendered unusually smooth, close, and FREE FROM SURFACE CRACKS, thus, in a great measure, preventing leakage and the adhesion of carbon to their interior surface.

To meet the yearly increasing demand of UPWARDS OF THIRTY SEASONS and to carry out the late improvements in the manufacture, the Premises have been re-erected and much enlarged, and Engineers may rely WITH CONFIDENCE on their orders being completed with a greater regard to despatch than by any other House.

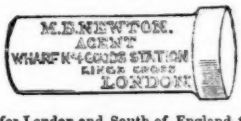
THE WORKS ARE WELL SITUATED

For EXPORT from the Ports of { LONDON, LIVERPOOL, HULL, MIDDLESBRO', HARTLEPOOL, and STOCKTON.

FIRE-BRICKS, LUMPS, GUARDS, TILES, AND CLAY OF THE SAME QUALITY.

M. B. NEWTON, London Agent, No. 4, Wharf, King's Cross Goods Station.

J. CLIFF'S Fire Bricks, Clay RETORTS, &c.



Orders for London and South of England to be addressed to Mr. NEWTON, Agent for the District, 16, Castle Terrace, New Hampstead Road, KENTISH TOWN, N.W.

N.B.—A few Retorts of each size, and a large stock of Bricks and Lumps, always on hand at the above Wharf.

KINSON FIRE BRICKS are indestructible by heat, and are warranted to last twice as long as Stourbridge, Newcastle, or Welsh bricks. 80s. per 1000 at Nine Elms Station.

WORKS: POOLE, DORSET.

WILLIAM RYDER, General MINERAL AND METAL AGENT AND MERCHANT, 4, DEAN STREET, NEWCASTLE-ON-TYNE,

is prepared to supply Gas and Water Companies with Apparatus and Appliances of every description, including Cast and Wrought Iron Goods, Coals, Fire-Bricks, Retorts, &c. &c.

Any communications addressed to him as above shall have prompt attention.

WROUGHT-IRON Guides for Gas. HOLDERS, when Trussed upon scientific principles, are more capable of resisting strains, in every direction, than Cast Columns of any form can be; and weigh only one-fifth as much as the latter. Designs and Working Drawings for Guides and Ties can be obtained of the Inventor, CHARLES DIXON, C.E., Chichester, SUSSEX.

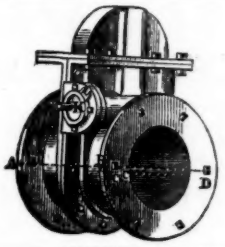
BENJAMIN GIBBONS, Jun., DEEPDALE FIRE-CLAY & BRICK WORKS, Near DUDLEY,

Manufacturer of every description of Fire-Bricks, Lumps, Quarries, Shields, Flue Covers, &c., to any size or shape required.

FIRE-CLAY RETORTS, TO MODEL OR DRAWING.

B. G. begs to call the attention of Gas Companies to his Fire-Clay Retorts, which have been used with great satisfaction in some of the largest Gas-Works in the Metropolis and many Provincial Towns in England.

References given, if required.



BRYAN DONKIN & CO.

keep always on stock their

IMPROVED GAS VALVES

from 2 inches to 18 inches, price 11s. 6d. to 13s. 6d. per inch diameter

List of prices, with full dimensions of all sizes up to 27 inches, to be had on application.

These Valves are all proved to 30 lbs. on the square inch before leaving the works.

BRYAN DONKIN & CO., *ENGINEERS,*

NEAR GRANGE ROAD, BERMONDSEY.

BIRTLEY IRON WORKS, CHESTER-LE-STREET, DURHAM.

Manufactory for every description of Casting and Machinery for Gas Works and Water Works.

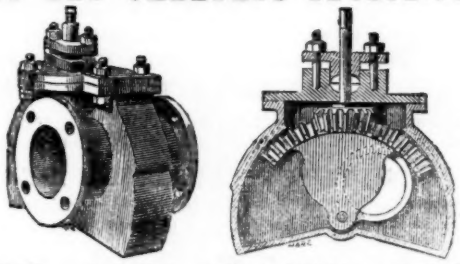
Warehouse in London for Cast-iron Pipes and Connections of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

Office in London, Mr. E. M. PERKINS, 78, Lombard Street.

HARRIS and PEARSON PROPRIETORS OF BEST CLASS-HOUSE POT AND CRUCIBLE CLAY. MANUFACTURERS OF **FIRE BRICKS GAS RETORTS &C.** AMBLECOTE FIRE CLAY AND BRICK WORKS, STOURBRIDGE.

Late in the occupation of I. and W. King. Originally J. Pidcock, Esq.

BEST AND CHEAPEST SLUICE-COCK.



BROWN AND MAY'S PATENT.

Above 3-inch diameter, price 10s. per inch. Brass face, 6d. per inch extra.

Can be taken to pieces without being removed from the line of Piping.

NORTH WILTS FOUNDRY, DEVIZES.

Wholesale Agents, Messrs. S. and E. RANSOME, 31, Essex Street, Strand, E.C., Where a Sample may be seen.

WILLIAM INGHAM AND SONS,

WORTLEY FIRE-BRICK AND RETORT WORKS,

Near

Leeds.

W. INGHAM and SONS, having for many years been extensively engaged in the Manufacture of

RETORTS AND FIRE-BRICKS FROM THE CELEBRATED WORTLEY FIRE-CLAY,

beg to call especial attention to their RETORTS, which have for many seasons proved to be unsurpassed in quality by any in the Kingdom, their FREEDOM FROM CRACKS and the ADHESION OF CARBON rendering them worthy the attention of all parties interested in the making of Gas.

The Works are of such magnitude as to ensure the prompt execution of orders to any extent.

Estimates for Setting, or Bricklayers sent when required.

GAS OVENS IN SEGMENTS OF EQUAL QUALITY.

London Agents: CHADWICK and AKEROYD, Willington Stone Wharf, Regent's Park Basin.

A large stock of Fire-Bricks, Fire-Clay, Terra Cotta, and Drain-Pipes of all sizes kept in London at CHRISTIE & CO.—Wharf, 64, Bankside, Southwark, where all particulars of Prices, &c., may be obtained.

N.B.—*Export orders continue to have prompt attention.*

SALE OF GAS ACT.

MESSRS. CROLL, RAIT, AND CO.,

Manufacturers of Croll's Patent Improved

DRY GAS-METER,

Also Manufacture and Supply

TEST GAS-HOLDERS,

And other Apparatus required by the Inspectors appointed in pursuance of the above Act.

Application for particulars to be made to the Factory,

CANAL BRIDGE, KINGSLAND ROAD, LONDON, N.E.

ALEXANDER WRIGHT,

55 and 55A, MILLBANK STREET, WESTMINSTER, S. W.,

MANUFACTURER OF

CONSUMERS' WET GAS-METERS,

Of the best material and workmanship, carefully adjusted to meet the requirements of the SALES OF GAS ACT.

CONSUMERS' COMPENSATING GAS-METERS,

Which have secured the highest approbation and patronage, on account of their simplicity of construction, thorough efficiency, and moderate price.

STATION-METERS AND GOVERNORS,

Of all sizes, constructed with the most careful regard to durability, accuracy, and freedom from excessive friction. A LARGE NUMBER are in use, and give perfect satisfaction.

EXPERIMENTAL TESTING APPARATUS,

COMPRISING

PHOTOMETERS, SPECIFIC GRAVITY APPARATUS, BI-SULPHURET OF CARBON TEST, THOMPSON'S BROMINE AND HEATING POWER OF FUEL TESTS, IMPROVED ALKALIMETER, EXPERIMENTAL METERS AND GOVERNORS, MINUTE CLOCKS, &c., &c.

These apparatus are employed by the best experimenters in this country and on the continent, and by nearly all the Gas Companies in London, for the use of the appointed testers in the various districts.

WRIGHT'S REGISTERING PRESSURE-GAUGE,

Is universally used, and affords valuable aid in effecting a due regulation of pressure, thereby saving much of the leakage arising fromheavy pressures when the consumption is decreasing.

WRIGHT'S EXHAUSTER REGISTER and REGULATOR,

are of the highest utility, as by the one a due check is maintained on the working of the Exhauster, and by the other all possibility of excessive exhaust is avoided.

TEST GASHOLDERS,

Of all sizes, of the most perfect character, accurately graduated to the Exchequer Standard.

Consumers' Governors; Inspectors' Pocket, King's, and all other kinds of Pressure-Gauges; Thermometers for Condensers, &c., &c.

"Analysis of Gas for Practical Men," by A. WRIGHT, M. Inst. C.E., post-free for 13 Stamps.

PRICE-LISTS ON APPLICATION.

D. HULETT and CO., 55 and 56, HIGH HOLBORN, LONDON,

PATENTEES and MANUFACTURERS of the ONLY GOOD MERCURIAL GAS REGULATOR,

invite the attention of Gas Companies and the Trade generally to their Improved GAS-METERS, which they warrant equal to any in Quality, Workmanship, and Simplicity of Construction, and the only Meters from which Gas cannot be obtained without being duly registered.

MANUFACTURERS OF

GAS CHANDELIERS, GLASS LUSTRES, HALL LANTERNS, VESTIBULES, BRACKETS, PENDANTS;

DOUBLE CONE, ALBERT, SHADOWLESS, & EVERY DESCRIPTION OF BURNER, UNION JETS, BATSWINGS, ETC.;

IMPROVED FULL-WAY CARTER'S VALVES (much approved of);

GAS-STOVES, and every article connected with Gas Apparatus.

CAST & WROUGHT-IRON PIPE, BLACK & GALVANIZED. COPPER. TIN, BRASS, & COMPOSITION TUBING.

D. HULETT'S IMPROVED SERVICE CLEANSER

for clearing out Mains, Services, and Interior Fittings—60s. net.

Boyle's Patent Silvered Glass Combination Reflectors and Outside Lanterns.

Sole Manufacturers of Church and Mann's Photometer.

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